ELECTRICAL REVIEW

FOUNDED 1872

Vol. CXXXI. No. 3384. OCTOBER 2, 1942 6d. WEEKLY

COMPACT

CORRECT

FM 80

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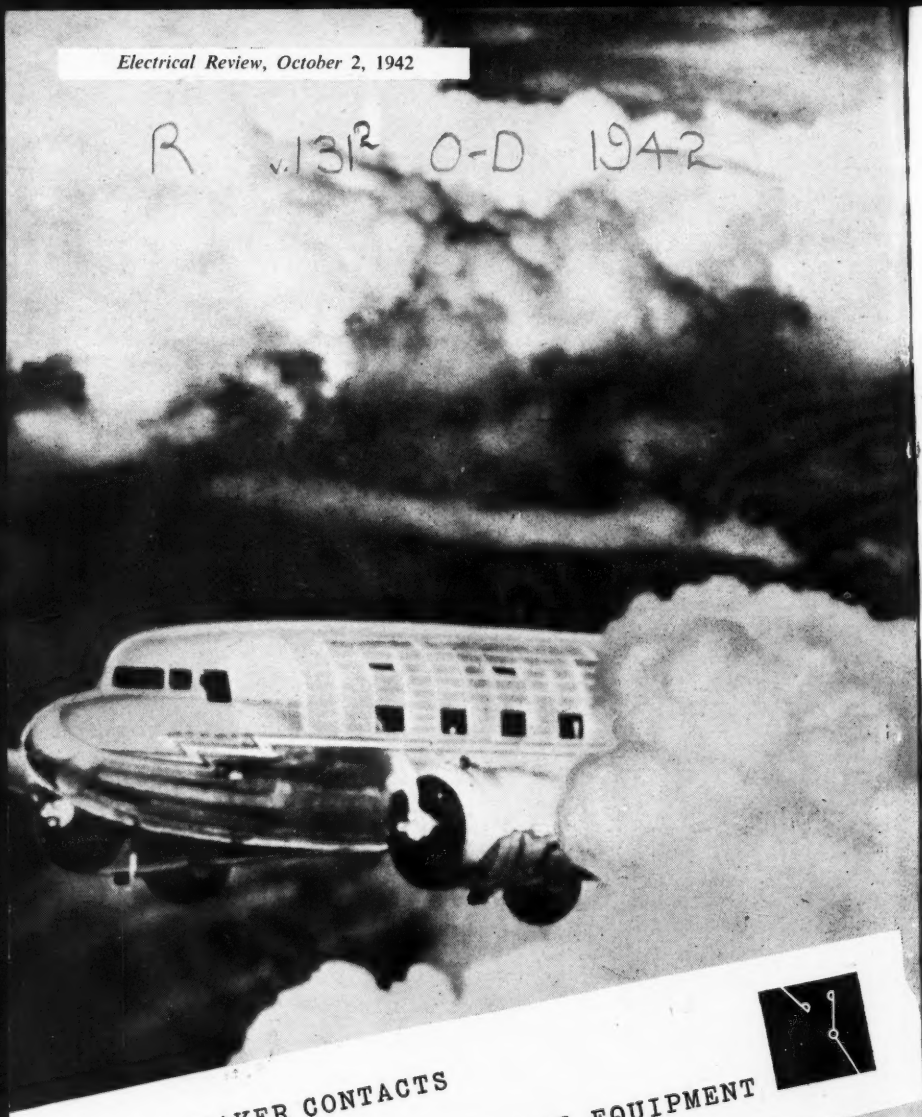


SPECIFY BAKER CONTACTS

WHEN DESIGNING ELECTRICAL EQUIPMENT

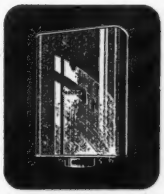
Tech

BAKER PLATINUM LTD. 52 HIGH HOLBORN LONDON WCI

HEATRAE

AN ESCUTCHEON HELD HIGH FOR
REPUTATION

Repute is a quality that cannot be begged, borrowed, bought or stolen. It must be earned by estimation.



Quantity of output rarely earns repute—but Quality does—at least in our experience.

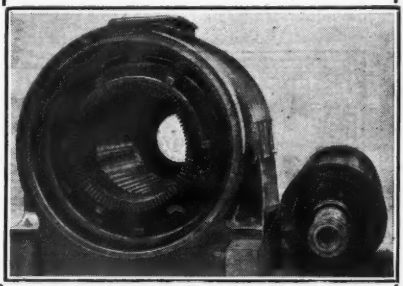
Leaders in Electric Heating

HEATRAE LTD., NORWICH • PHONE : NORWICH 25131 • GRAMS : HEATRAE, NORWICH

REPAIRS

The WESTMINSTER ENG. Co. Ltd.

Victoria Road, Willesden Junction, N.W.10



1500 kVA Turbo Generator Stator and Rotor Entirely Rewound

Makers of Electric Welding Machines, Photo Printing and Process Arc Lamps. "Partridge" Pressure Detectors

Telephone: Willesden 1700-1

Telegrams: "Regency, Phone, London."

SOUND TERMINAL WITHOUT SOLDER

Suitable for Telephone Lines

FOR CABLES AND WIRES OF ALL KINDS

SIZES FROM ¼" to ⅜" HOLE

ROSS COURTNEY & Co. Ltd.

ASHBROOK ROAD, LONDON, N.19

CATCHES

to the specific requirements of our customers

Makers of all types of repetition products from the bar in all metals

M-C-L and REPETITION LTD. Pool Lane, Langley, Wham.

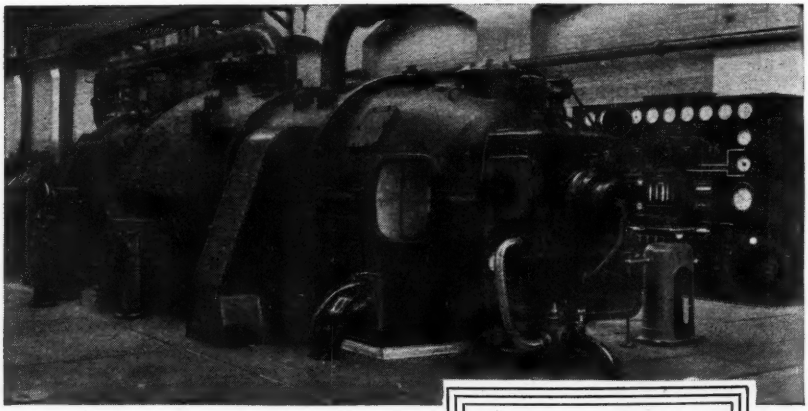
Large

BRUSH

LJUNGSTRÖM

Turbo-Generator Sets

• QUICK Starting
• *QUICK Re-Starting*
GUARANTEED ! !



PEAK LOAD demands necessitate quick starting and, most important of all, speedy re-starting at all times, and for this service, the " BRUSH - LJUNGSTRÖM " Turbo-Generator is most outstanding.

The REASON

The Turbine has short shafts and the lightest mass of rotating parts with the most robust construction. These, together with the effective provision for expansion and contraction, enable the set to meet any condition of service.

THE BRUSH ELECTRICAL ENGINEERING CO. LTD. LOUGHBOROUGH ENGLAND

5.75

Because PREMIER is, for obvious reasons, severely restricted in the production of its own Fine-Quality, it presents some little gems of fine quality from the books of our day

"It'll do!"

My work in the theatre has taught me many lessons, but the most important is that only the best is good enough.

We all choose for ourselves certain rules of life, though we do not always keep them. We are all human, and often fail to reach the standards at which we aim. But the important thing is to aim high. I have always found that my most successful productions have been those with which I have aimed highest and taken most trouble. My failures have mostly been those of which I could not honestly say that they satisfied me.

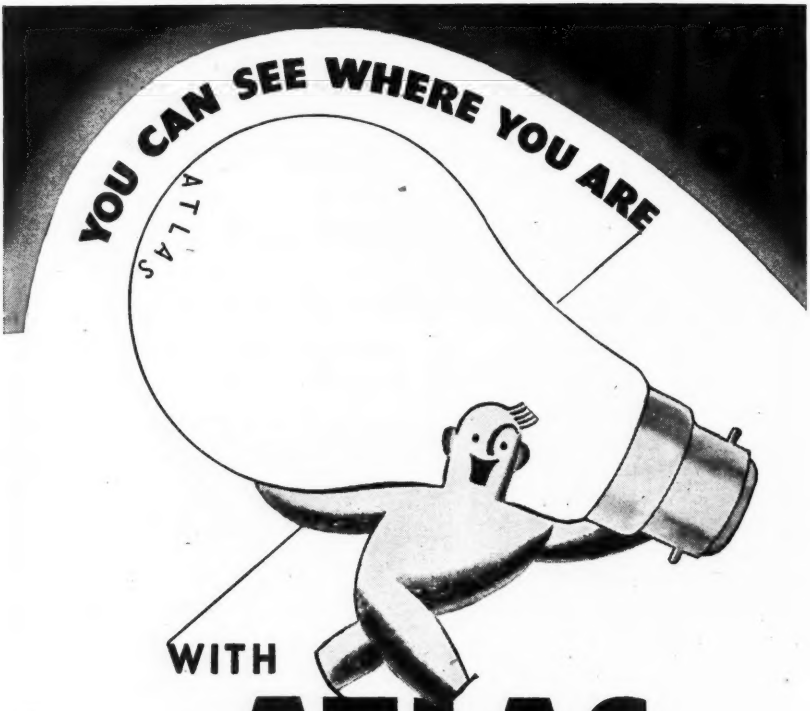
The worst fault in the theatre is the tendency to slacken off just when one's most strenuous efforts are needed to ensure a satisfactory finish. "It'll do" is an evil phrase, far too common. It is a poisonous drug, and responsible for all the faulty work done in the home, the shop, the factory and the theatre.

From "COCK-A-DOODLE-DO" by Charles B. Cochran. (Reproduced by kind permission of the publishers, J. M. Dent & Sons Ltd.)

PREMIER *Fine-Quality*

electric heating appliances, including the famous "Laundwell" and "Smoothwell" electric irons; "Quickset" and "Pylon" electric kettles; electric fires; toasters; coffee percolators; multi-boilers, glue-pots and other appliances.

PREMIER ELECTRIC HEATERS LIMITED · BIRMINGHAM, 9

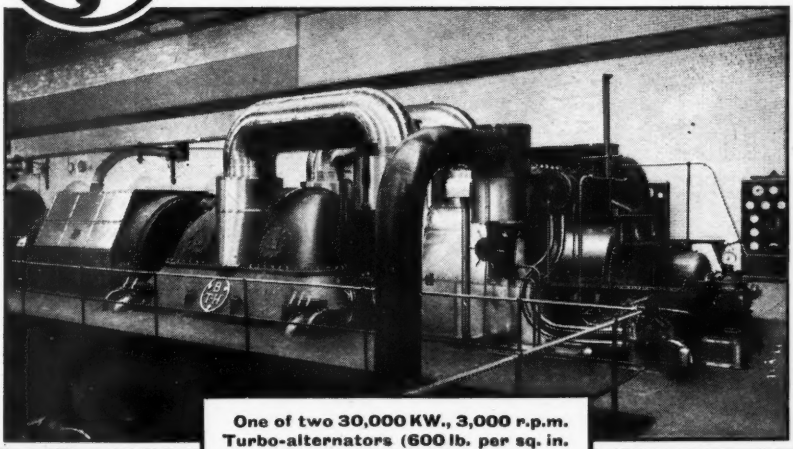


You don't have to take chances because every Atlas Lamp goes through such rigid tests at the factory, just as exacting now as in peace time, that you can sell them with confidence. Very large users — who can and do keep accurate tests of lamp performance — buy more Atlas Lamps than any other single make. You make more profit by selling Atlas. Ask for our current terms.

THORN ELECTRICAL INDUSTRIES LTD., ATLAS LAMPS DIVISION, 105-109 JUDD STREET, LONDON, W.C.1.
Telephone: Euston 1183 (7 lines) Telegrams: "Eleclampo, Kincross, London."

Northern Branch: 55 Blossom St., Manchester. 'Phone: Central 7461-2-3. 'Grams: "Eleclampo, Manchester."
North Eastern Depot: 46 Sandhill, Newcastle-on-Tyne 1. 'Phone: Newcastle 24068-9. 'Grams: "Macu, Newcastle-on-Tyne."
Scottish Depot: 200 St. Vincent Street, Glasgow. 'Phone: Central 4015 (*Pte. Branch Ex.*) 'Grams: "Calyou, Glasgow."

B T-H TURBO-ALTERNATORS



One of two 30,000 KW., 3,000 r.p.m. Turbo-alternators (600 lb. per sq. in. gauge pressure, 825° F. total temperature) installed in a British Municipal Power Station.

BTH products include turbine plant of any type and any capacity; all kinds of heavy electric plant; rectifiers; switchgear; transformers; electric traction equipment for road or rail; electric ship propulsion and ship's auxiliary electrical equipment; industrial motors and control gear; industrial heating equipment; Fabroil pinions; Mazda, Mercra, and Sodra lamps; industrial and public lighting; photo-electric, electron tube, and **many other devices.**

BTH

THE BRITISH THOMSON-HOUSTON CO., LTD.
CROWN HOUSE, ALDWYCH, LONDON, W.C.2.

A 3080

AEI

PECULIAR
PRATTLE

"STRONG AS A HORSE"

This well-known expression was probably coined when the use of horses in Industry was more prevalent than it is to-day.
It is a phrase which could be modernized by varying it to read, for example, "As strong as Wire, or Wire Ropes, or Hemp Cordage."
We make these goods for one-thousand-and-one purposes, and we see to it that their strength will withstand the heavy work imposed upon them.

POPPY APPEAL FUND
NOV 11
Please Give Generously
REMEMBRANCE DAY

BRITISH ROPES LIMITED

BRITISH ROPES *Limited*

Head Office : DONCASTER *Sales Offices and Works throughout Great Britain*

GROWING TOO BIG FOR HIS CLOTHES

In other words, Ensign business in the Midlands has increased to such proportions that our Birmingham Depot is moving to larger premises at

40 & 42 SUMMER ROW
BIRMINGHAM

Telephone: CENTRAL 2997 & 3164

Depot Manager - - Mr. Oliver W. Saunders

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ENSIGN LAMPS LTD. KENT STREET WORKS, PRESTON

Tel.: Preston 4628

LONDON (Northern): Clay Hill, Bushey, Watford, Herts. Tel. Bushey Heath 1947
(Southern): 10, Kingston Hill, Kingston-on-Thames, Surrey. Tel. Kingston 1293
GLASGOW (C2): 42, York Street. Tel. Central 2724
LEEDS (1): Wellington Street Tel. Leeds 31584/5
CARDIFF: 50, Bridge Street Tel. Cardiff 5426
MANCHESTER (3): 63, Bridge Street. Tel. BLAckfriars 7599
BIRMINGHAM (1): 40/42, Summer Row. Tels. Central 2997 & 3164
N. IRELAND: 38, Bedford Street, Belfast. Tel. Belfast 26178

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MEANS
GREATER OUTPUT

D & G GIRDER FITTING

FOR MACHINE TOOL AND BENCH LIGHTING

- Universal movement
- Concentration of light on the job
- Protects operators' eyes from glare
- Lower consumption
- Less lamp breakages

Made in Single-, Two- and Three-arm Extensions

Adopted by many of the Armament and other War Production firms

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Midland Representative:
W. T. BOWER, 184 Lockey Road, Sutton Coldfield

Remember the name

George Burn tested super steel CONDUIT

You'll want it again

George **BURN** *Ltd.*

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SMETHWICK, BIRMINGHAM
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dm785

WHAT THOUSANDS OF CONSUMERS WILL SEE

when checking their current consumption during the current — emergency

IN THE BATTLE FOR FUEL

SAVES RUBBER!

"Relt" is a new technique in rubber moulding (Patent applied for). It is the result of the extensive joint research drive carried out by the Empire Rubber Company and the Bury Felt Company, with the object of saving rubber.

"Relt" mouldings have a felt core surrounded by a rubber corral. They can be made in varying degrees of resilience and in many cases have advantages over the normal type of rubber moulding.

"Relt" mouldings compared with pure rubber mouldings are 30% to 75% lighter in weight and they save up to 75% of rubber.

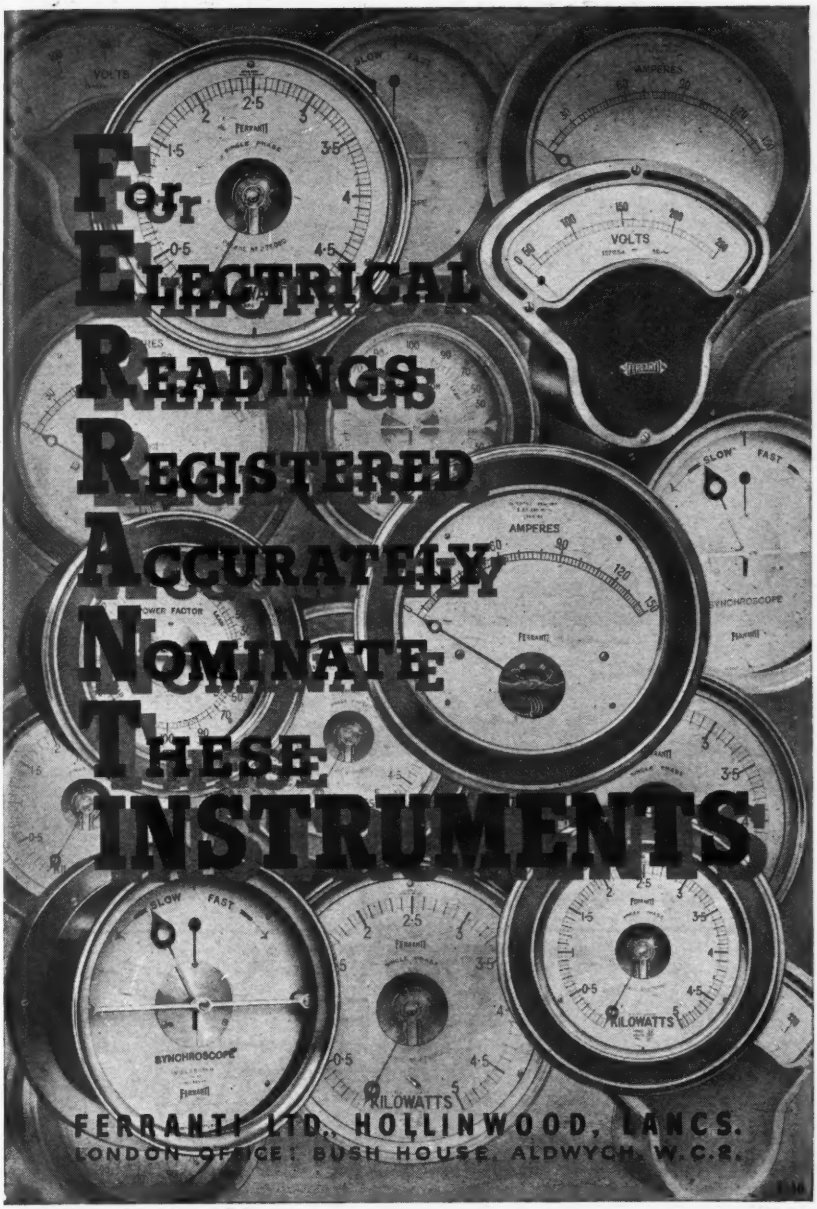
"Relt" is an answer to the rubber shortage.

SEND US YOUR ENQUIRIES FOR "RELT" MOULDINGS BUT MAKE SURE TO TELL US JUST WHAT YOUR COMPONENT HAS TO DO

OUR COMPLETE TECHNICAL SERVICE IS AT YOUR DISPOSAL

EMPIRE RUBBER CO.
DUNSTABLE - BEDFORDSHIRE
Phone DUNSTABLE 533 - Grams SPANDIT, DUNSTABLE

BURY FELT MFG CO LTD
HUDCAR MILLS - BURY - LANCS
Phone: BURY 576


For
ELECTRICAL
READINGS
REGISTERED
ACCURATELY
NOMINATE
THESE
INSTRUMENTS
VOLTS
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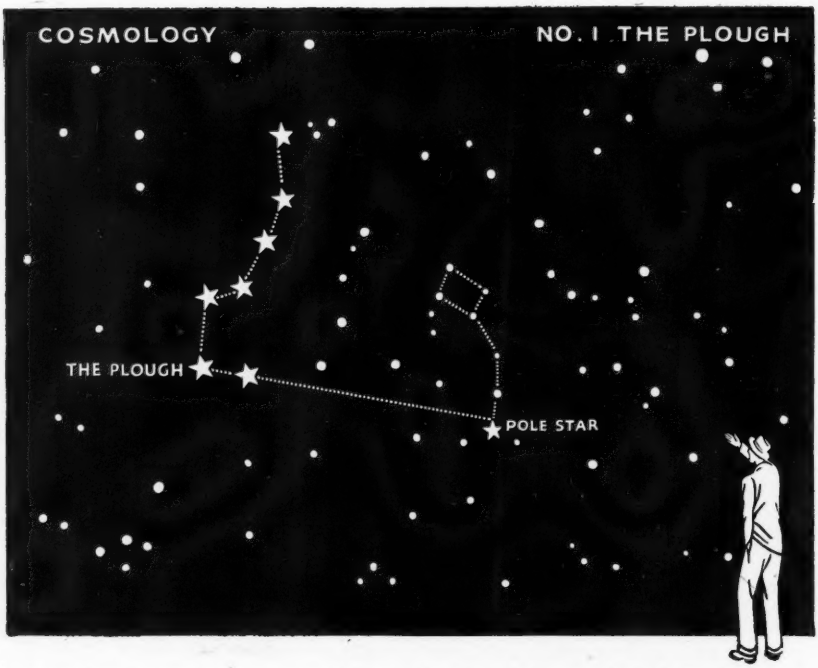
FERRANTI LTD., HOLLINWOOD, LANCS.
LONDON OFFICE: BUSH HOUSE, ALDWYCH, W.C.2.



You need never lose your direction on a starry night if you learn to recognise a few of the principal "constellations" or groups of stars.

The constellation emphasised above and familiarly known as the "Plough" includes seven prominent stars, two of which act as "pointers" towards the Pole Star, which lies directly above the Earth's North Pole and is a fixed point round which the entire stellar system, including the Plough, appears to revolve slowly from East to West (once every 23 hours 56 minutes).

Although the position of the Plough, as it revolves around the Pole Star, depends on the date and time of day, you will have no difficulty in recognising it and locating the Pole Star by means of the "pointers."

THE POLE STAR LIES DUE NORTH.

COSMOS
AND
METROVICK
LAMPS
Metrovick's 'light' product

FUEL ECONOMY—
USE LESS LIGHT
BUT
USE IT *Well*

METROPOLITAN-VICKERS ELECTRICAL CO. LTD.
NUMBER ONE KINGSWAY, LONDON, W.C.2.

stripped water

In preparing flax and hemp for ropes it is first stripped from its stem, slit into lengths and scraped through a bamboo instrument until only clean fibre remains. This extensive preparation of stripping, slitting and scraping is essential to produce a first-class quality fibre.

The stripping of water of its scale-forming and soluble salts for use as boiler feed is effected by the Permutit "Deminrolit" Process which, not only obtains the results without the use of heat or steam, but also eliminates ammonia and corrosion of condensers.

The modern method of feed water treatment and conditioning is described in our Technical Publication "Distilled Water without Distillation" which will be forwarded on application to The Permutit Company Limited, Dept. T.W., Gunnersbury Avenue, London, W.4. Chiswick 6431.

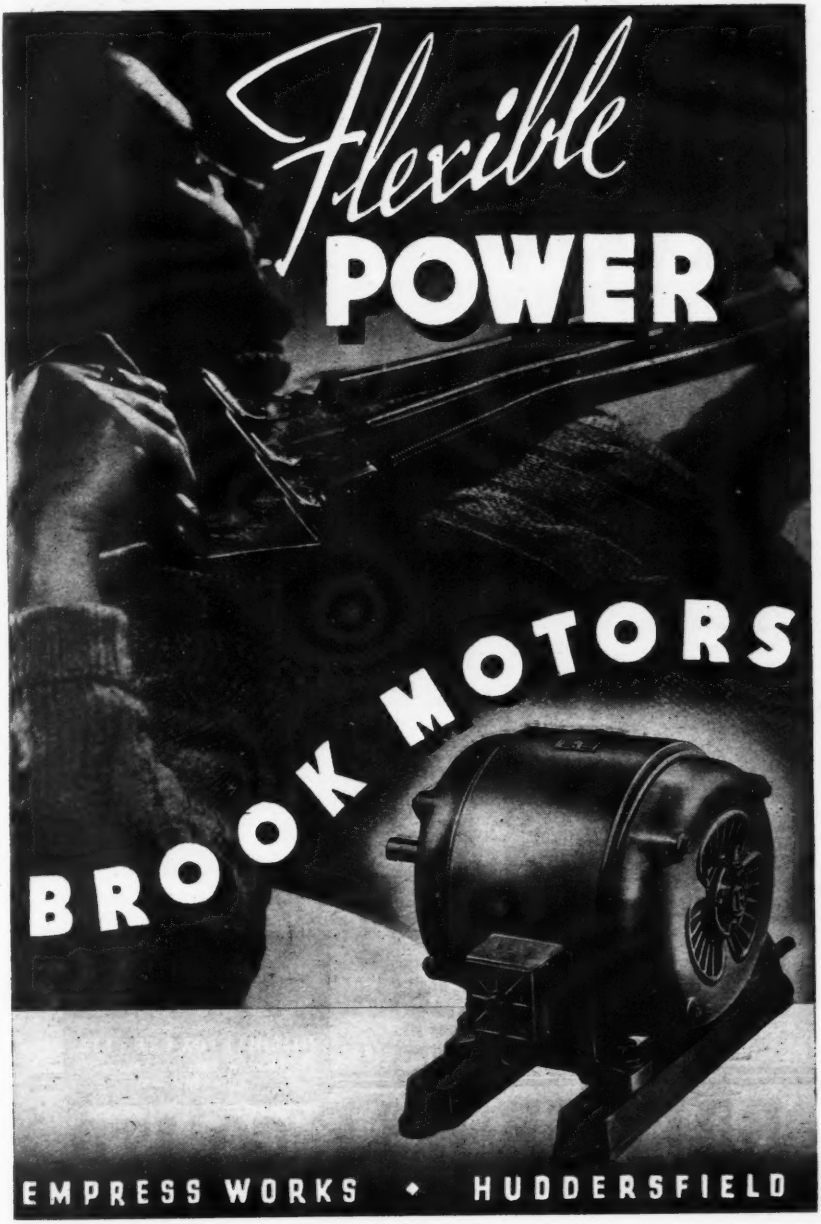
PLAYING THEIR PART *Today*

ASHTON
CABLES AND FLEXIBLES

As supplied to H.M. Government Departments and all Electrical and Allied Trades.

Proving their reliability everywhere

MADE BY
AERIALITE *Ltd.*
CASTLE WORKS · STALYBRIDGE · CHESHIRE


Flexible
POWER
BROOK MOTORS
EMPRESS WORKS • HUDDERSFIELD

MEASURING PERFECTION

Perfection in this machine age is a standard which sets its mark upon our generation. Constantly the endeavours of engineers are being directed towards the ideal. Perfection in the finished machine . . . . . perfection and nothing less . . . . that is the modern criterion.

But the standard of the machine can be no higher than the quality of the tools and the instruments used in its manufacture. Perfection in production is dependent upon perfection in tools.

In the manufacture of our precision instruments therefore, we aim at perfection, knowing that only by providing the highest class of measuring instruments will we be able to assist in the attainment of the ideal . . . . Perfection.

PRESENT MANUFACTURING RANGE

10" HEIGHT GAUGE ... ... ENGLISH OR METRIC SCALE
18" HEIGHT GAUGE ... ... ENGLISH SCALE
VERNIER CALIPERS ... 9" ENGLISH OR 25cm. METRIC SCALE

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BRITISH N.S.F. CO., LTD.

ALL ENQUIRIES TO OUR AGENTS

"ENFIELD" CABLES

WE ARE SPECIALISTS IN THE CONSTRUCTION OF THE FOLLOWING :

- PAPER INSULATED LEAD SHEATHED CABLES
- RUBBER WIRES AND CABLES
- BRAIDED AERIAL CABLES
- TELEGRAPH AND TELEPHONE CABLES
- VARNISHED CAMBRIC CABLES
- COTTON COVERED WIRES
- BARE HARD DRAWN COPPER WIRE AND STRAND
- ALL KINDS OF FLEXIBLE CORDS
- SPECIAL CABLES TO GOVERNMENT SPECIFICATIONS

THE ENFIELD CABLE WORKS LTD.

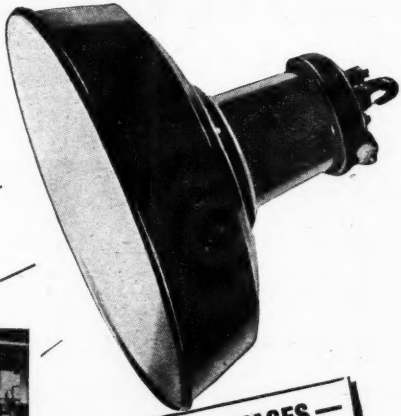
VICTORIA HOUSE, SOUTHAMPTON ROW

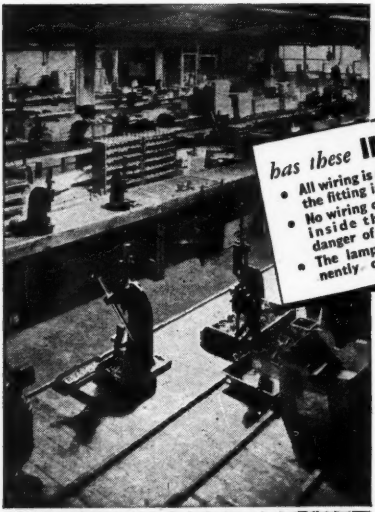
LONDON, W.C.I

Telegrams : ENFELCAMA, PHONE, LONDON. Telephone : HOLBORN 0591 (4 lines)

Branches : BIRMINGHAM BURTON-ON-TRENT GLASGOW MANCHESTER
BRIGHTON CARDIFF LEEDS STOCKTON-ON-TEES

THE S.L.R. FITTING





has these **IMPORTANT ADVANTAGES—**

- All wiring is complete before the fitting is sent out.
- No wiring cables or flexibles inside the fitting—no danger of over-heating.
- The lampholder is permanently connected to the inside terminals by stiff insulated wires.
- All live parts are thoroughly protected and comply with Home Office requirements.
- Reflector is instantaneously detachable for cleaning.

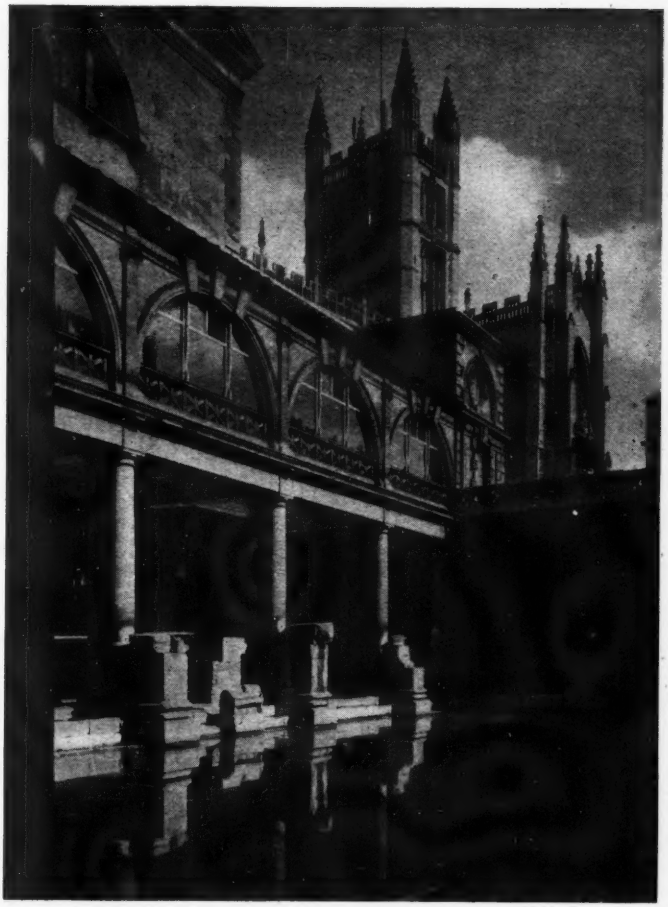
Factories (Standards of Lighting) Regulations 1941
ARE YOUR LIGHTS RIGHT?
Consult an **Eleco** Industrial Lighting Expert

THIS industrial dispersive reflector makes available a simple and practical wired-up fitting which can be put into *immediate* service. No time-waste . . . no expensive adjustments—the "S.L.R." fitting is sent out completely wired and ready for use. Installation costs are consequently reduced to the bare minimum. The design of the reflector conforms to B.S. Specification No. 236, No. 1.

ENGINEERING & LIGHTING EQUIPMENT Co LTD

DEPT. W.S., SPHERE WORKS, ST. ALBANS, HERTS.
PHONE: ST. ALBANS 2258 · 2259

Beauty that endures—

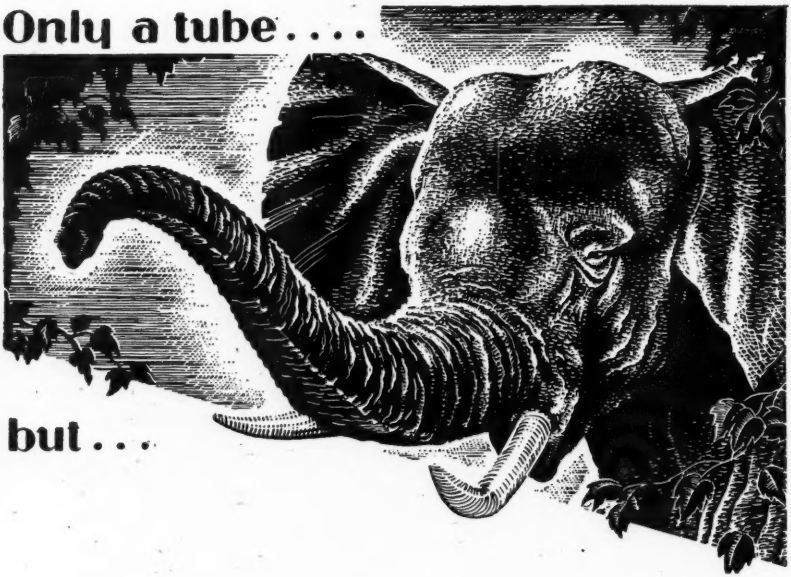


The Great Roman Bath, Bath, Somerset

From the First to the Fifth Century the community of Roman Britain enjoyed high standards of civic and domestic life, and many remains of buildings, roads, and amphitheatres are left to tell the story of this period. One of the most important relics of these days is the Great Roman Bath, the still waters of which now reflect the dignity and grace of the XVth Century tower of the famous Abbey.

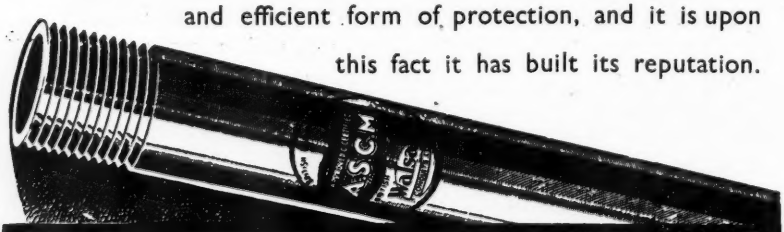
Titanine Limited, Colindale, London, N.W.9 *Telephone: COLINDALE 8123 (6 lines)*
CELLULOSE & SYNTHETIC LACQUERS · PAINTS · VARNISHES & ENAMELS

Only a tube....



but...

the Elephant's trunk, with its 40,000 or so muscles, is probably the strongest organ in Nature—capable of lifting nearly a ton or catapulting a man 40 yards. It is a multi-purpose organ whereby the Elephant "winds" his foes, feeds himself, drinks, and performs his ablutions. "Walsall" Conduit does not, of course, claim any adaptabilities to so many uses. Its purpose in life is solely that of providing electric cables with the most durable and efficient form of protection, and it is upon this fact it has built its reputation.



WALSALL CONDUITS LTD · WEST BROMWICH · STAFFS

'ENGLISH ELECTRIC'

Fractional H.P.

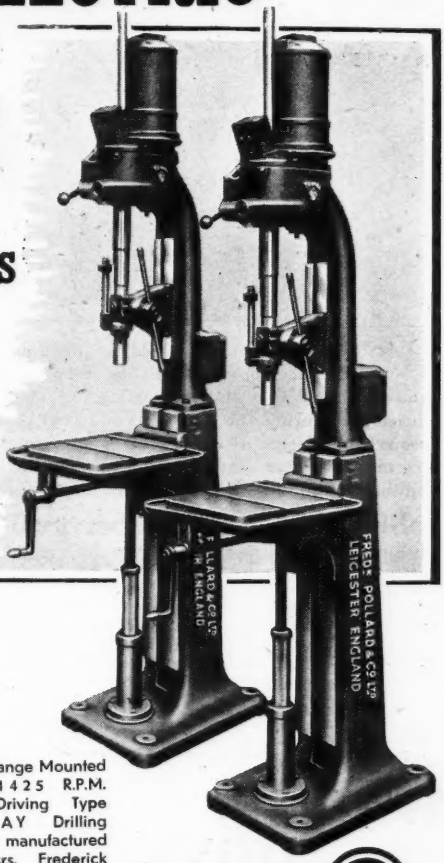
MOTORS

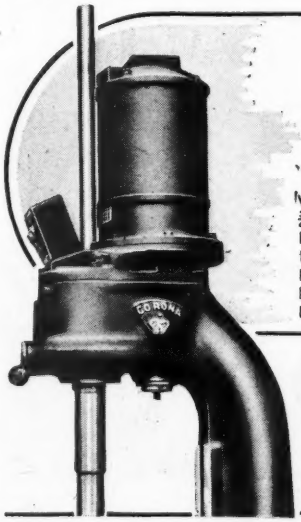
FOR SPECIAL APPLICATIONS

A further application of the adaptability of "English Electric" Fractional H.P. Motors, on this occasion fitted to Frederick Pollard Type No. 13 AY Drilling Machines.

This is only one of the 1001 applications satisfactorily performed all day and every day by "English Electric" Fractional H.P. Motors. If you buy similar motors it will pay you to send for a copy of publication T 34B describing and illustrating these machines

Should you have a new or special application, let one of our Specialist Engineers discuss it with you.

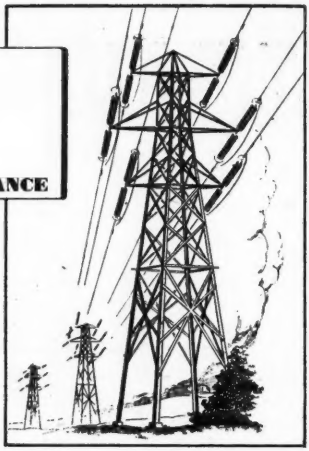




Vertical Flange Mounted ¾ H.P. 1425 R.P.M. Motor, Driving Type No. 13AY Drilling Machine manufactured by Messrs. Frederick Pollard.

THE
ENGLISH ELECTRIC
COMPANY LIMITED
•• STAFFORD ••

Solving one Problem of **MAINTENANCE**

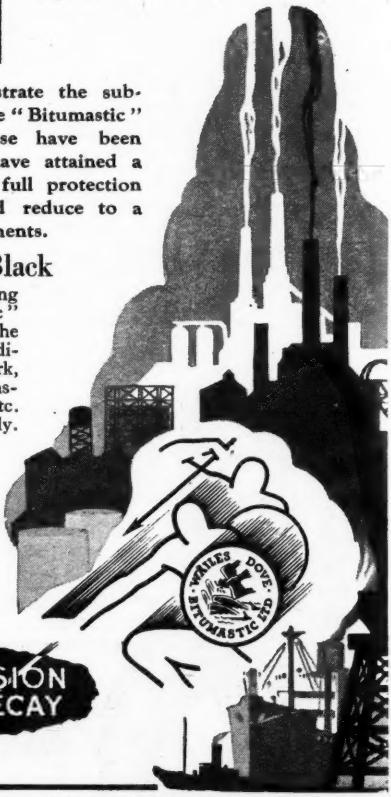


AMPLE evidence is available to demonstrate the substantial savings effected by the use of the "Bitumastic" and other Wailes Dove products. These have been developed during the last 87 years and have attained a remarkable degree of efficiency. They give full protection to metal, timber and other surfaces and reduce to a minimum the need for repairs and replacements.

"BITUMASTIC" Super Service Black

For the rough and tough jobs. Provides a coating three times as thick, coat for coat, as "Bitumastic" Solution or any ordinary protective paint. Just the thing for surfaces exposed to severe corrosive conditions. Is extensively used for structural steel work, outdoor H.T. Transformer Parks, Overhead Transmission Towers and for Accumulator Rooms, etc. Applied cold, straight out of the drum, by brush only.

Ask for ANTI-CORROSION GUIDE.
It gives helpful guidance as to the exact Wailes Dove preparation to use for any particular surface. Surfaces are listed under headings with thumb index for quick reference. Please mention Dept. L3.



WAILES DOVE DEFEAT CORROSION ROT & DECAY

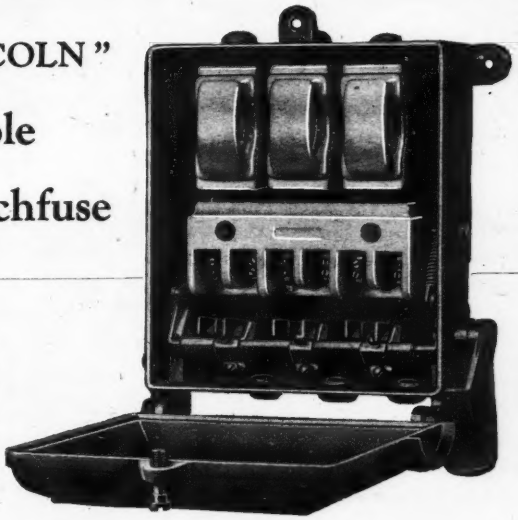
WAILES DOVE BITUMASTIC LTD., HEBBURN, CO. DURHAM
Telephone: Hebburn 32321-5

GD77/SSB

Crabtree "LINCOLN"

Triple Pole

Ironclad Switchfuse



Crabtree "Lincoln" 10/15 Amp. 250 volt triple pole switchfuses are designed to give lasting and reliable service and to provide the highest margin of personal safety. The highly vitrified English porcelain fuses are of the rewirable type and can be easily removed for inspection or renewal purposes. At the same time, the fixed contacts are deeply recessed in a porcelain "block," thus precluding any possibility of internal short-circuiting. The switch arm itself is heavily insulated and a decisive action is ensured by the provision of two strong springs. Since the switch handle is interlocked with the cover, it is quite impossible to open the unit under load; and as the cover fixing screw is drilled, the unit can be wire-sealed as a further protection against unauthorised tampering.

This advertisement does not imply that the products mentioned are necessarily available either in the United Kingdom or for export to any country overseas

CRABTREE

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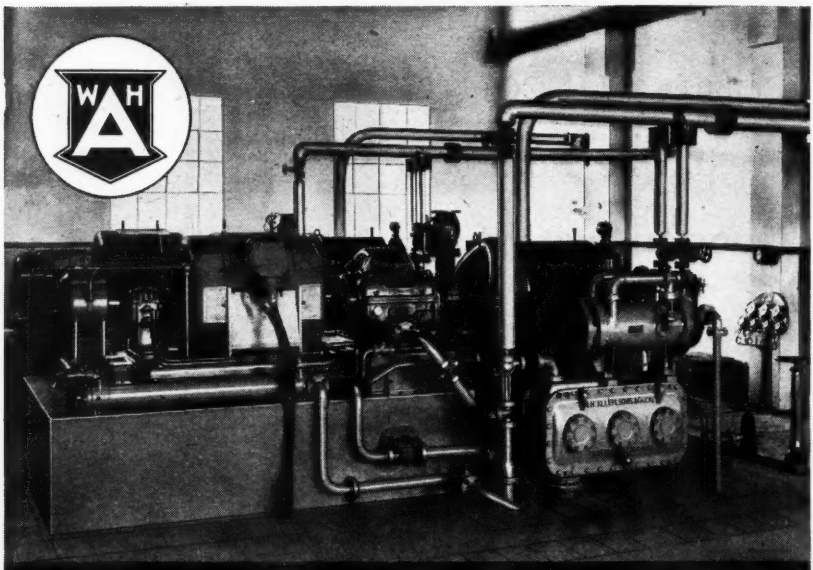

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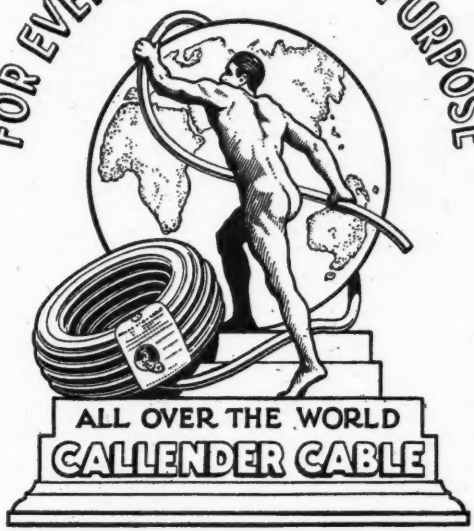

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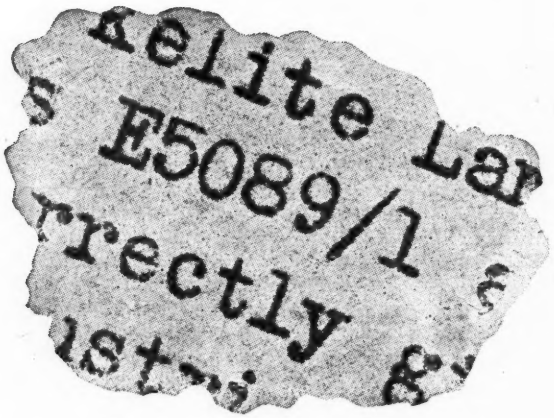

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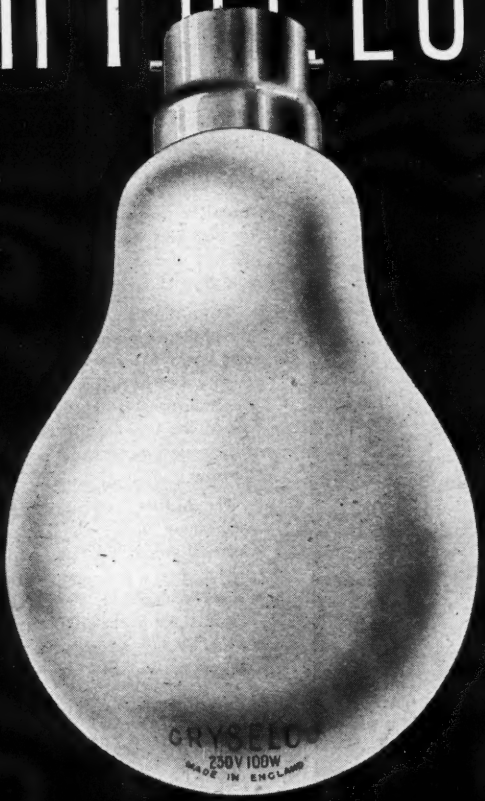

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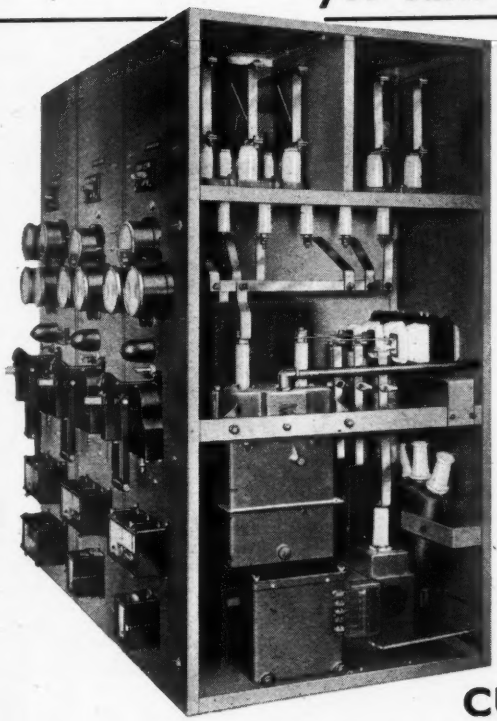

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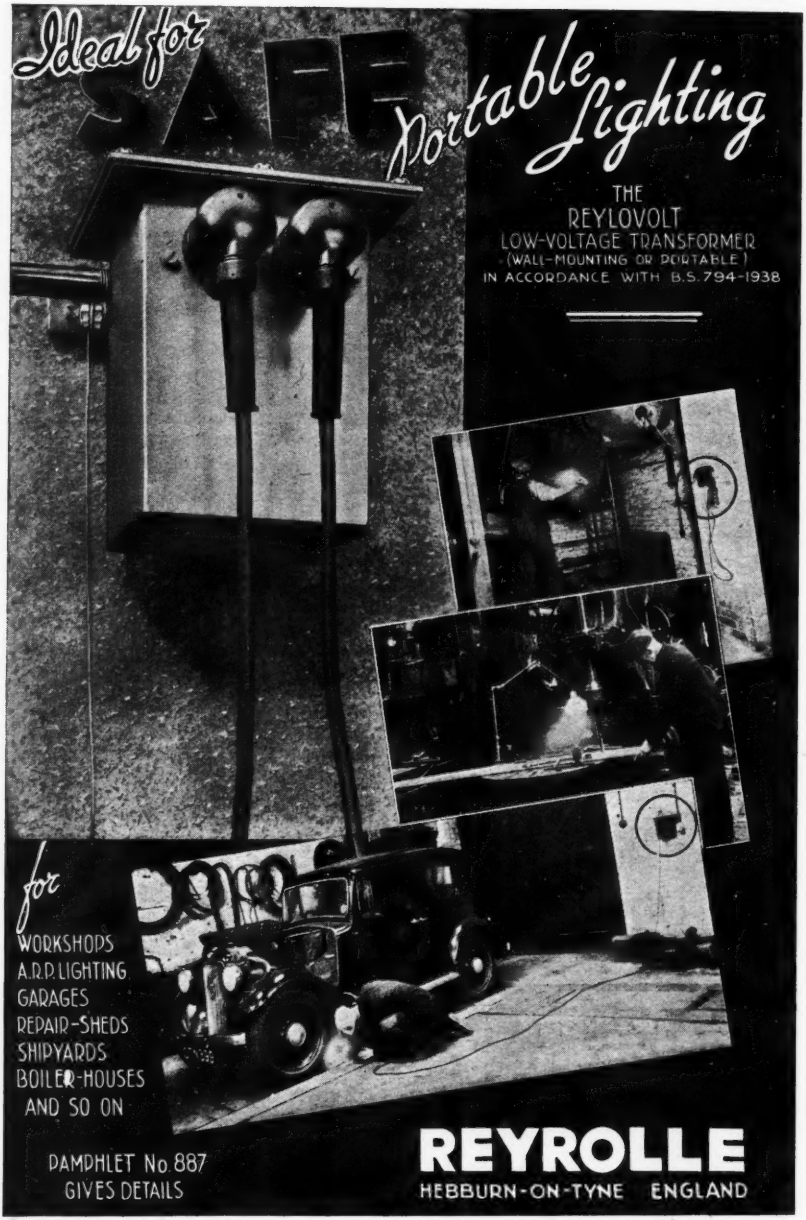
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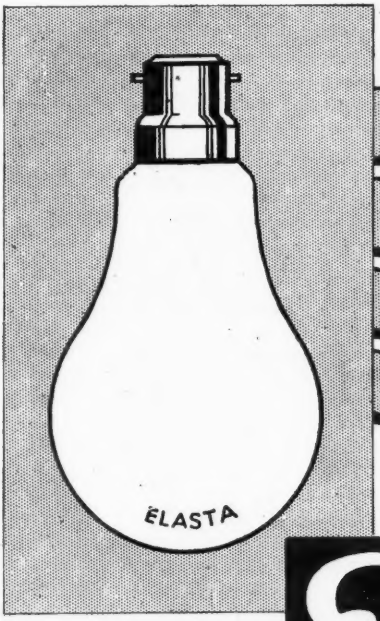

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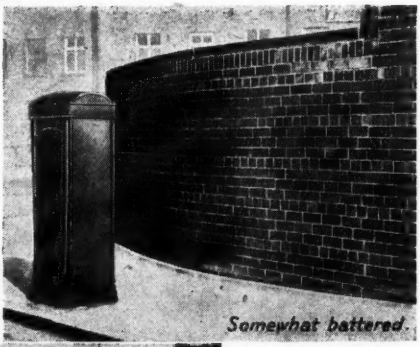
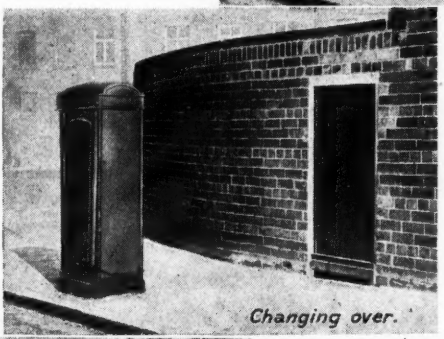
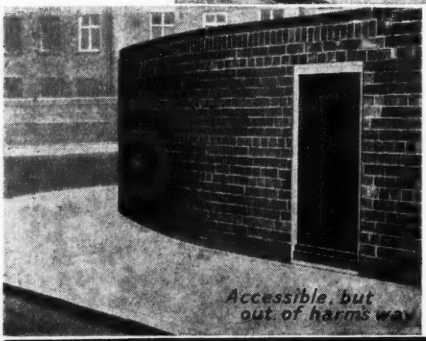


Somewhat battered.



Changing over.



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ELECTRICAL REVIEW

Volume CXXXI — No. 3384

Friday, October 2, 1942

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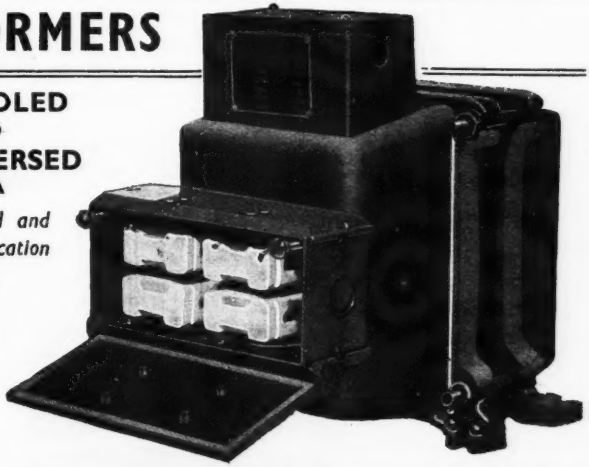

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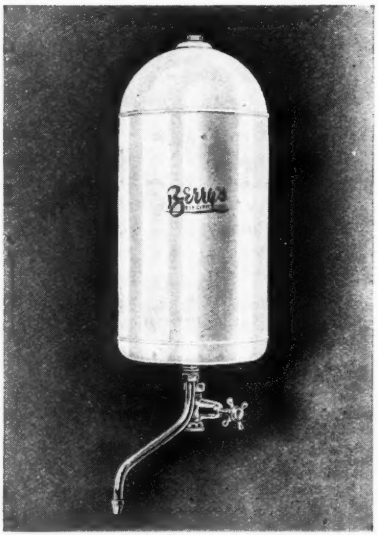

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THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXXI. No. 3384. OCTOBER 2, 1942 6d. WEEKLY

Fuel Economy

Great Britain's Coal Reserves

REALISATION of what a wartime shortage of coal can mean has caused a widespread awakening to the national value of this stored energy of the sun. That is all to the good, since our coal reserve is a wasting asset, the life of which was estimated by the Samuel Commission (1926) as 400 to 500 years. More recent statistics in the World Power Conference Handbook would allow 700 years as a probable limit.

Meagre Alternatives

Substitutes for coal in Great Britain are severely restricted. Easily first comes water power, but this seems unlikely to produce more than 5 per cent. of the total electricity required even now. There is only one considerable tidal-power possibility, the Severn Barrage, which would provide for less than one twentieth of to-day's consumption.

The position outlined above has caused uneasiness concerning the future among some of our readers. Reference has been made by correspondents to the need for coal conservation. Without quibbling over Chambers's dictionary definition of " conservation " as " the keeping entire," *i.e.*, hoarding, leading logically to reversion to sailing ships and the use of man or animal power to the greatest extent, we may assume that some drastic reduction in the consumption of coal is envisaged. Is it always clearly realised what lowering of national status and what personal austerities would have to be faced in order to provide possible benefits to a remote posterity, which is likely to be better equipped scientifically than is this generation ?

What reduction in coal usage can be made heavy enough to prolong the life of our stocks ? Before the war, nearly a quarter of our coal was exported annually to redress the balance of our foreign trade. Would this cease ? Also, what about the millions of tons used for the iron and steel industries ? Again, an idea of the industrial progress of a country was wont to be given by the horse-power employed per operative. Some leeway has still to be made up in order to get abreast of certain other leading industrial countries. For this, more coal, not less, will be needed, as it will be also for repairing the wastage of the war.

Electricity's Beneficial Influence

The amount of coal, approximately 180 million tons, supplied to the home market shortly before the war differed very little from that supplied in 1913. Nevertheless, most industrial categories show decreases in consumption, an exception being electricity generating stations. The increase here, which is only a small fraction of the total coal mined, must receive a good deal of the credit for keeping the home consumption in normal years at about the same level for a quarter of a century, despite the enormous growth in the mechanisation of industry and in domestic comfort during that period.

So much for the early future. As to the coal situation half a millennium hence,

the exploitation of solar energy in a less inefficient way than it is now is a proper subject for investigation under the auspices of the Ministry of Fuel. Meanwhile, we can believe that the fellow-countrymen of Faraday will be able, when happier times return, to enjoy to the full the fruits of his pioneering discoveries. They must understand, however, that the prolongation of material civilisation demands that thought be given to the future, however remote that future may appear to be.

Five Thousand Tons

IT is believed that in spite of the frequent appeals already made for the turning-out of all waste paper for reclamation there is still a vast amount in the works and offices of electrical manufacturing, contracting and supply undertakings. Accordingly a Committee representative of the industry has decided upon an intensive campaign in an endeavour to collect at least 5,000 tons of waste paper before the end of the year. Some details of the scheme appear in this issue and we ask all readers to play their part in achieving the organisers' aim.

Electricity Supply Statistics

ON page 420 we publish some figures relating to electricity supply in 1939/40, a period which included the first seven months of the war. These figures are more or less normal, as war production had not then got into its full stride. A fuller idea of the part electricity is playing in the war effort will be found in the editorial comment of our issue of June 12th.

Measurement

THE Meter and Instrument Section of the Institution of Electrical Engineers recommences its activities this month with the title of Measurements Section. The first clause of the Section rules has already been modified to leave no room for doubt about its scope including "all matters relating to electrical measurement and control, the design and application of the apparatus, and the materials employed in connection with them." The change is really little more than one of name for the Section has always endeavoured to concern itself with most aspects of electrical measurement. It never was intended to deal exclusively with meters and instruments as was thought by some members not too well acquainted with its fuller activities. But it is not intended that all papers coming within the freshly defined scope shall be confined to the Section. Papers on special processes of measurement which may be within the sphere of any of the other technical Sections will, as before, continue to be dealt with by them separately or jointly.

Minimum Charges

IN response to the sustained demand for the abolition of quarterly minimum charges by electricity supply authorities a kind of compromise has been introduced. While the minimum charge is suspended an undertaking is to be allowed to charge a sum of 25s. a year whether electricity to this value has been consumed or not. Speaking by and large, quarterly minima have generally ranged between 7s. and 15s. so that, in effect, the new arrangement represents a reduction of from 9d. to 8s. 9d. a quarter. The changing-over from two-part tariffs to flat rates is being facilitated but we cannot think that many consumers will find any advantage in making the alteration. The effect upon the finances of undertakings remains to be seen; it may result in a general increase in charges.

Rising Output in Sydney

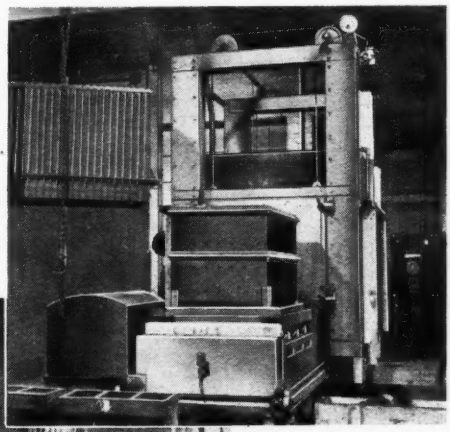
IT is pleasantly reminiscent of pre-war days to read of "a successful year's operations" in terms of more consumers and greater output. In his foreword, dated April 6th, to the report of the Sydney (N.S.W.) County Council for the past calendar year the general manager, Mr. R. Vine-Hall, makes this comment in pointing to the fact that the sales of electricity to the Council's 271,608 customers amounted to 760·4 million kWh a rise of nearly 9 per cent. compared with 1940. Actually, the increase of 83½ million kWh in electricity generated was the highest since 1933, and is probably a record advance. This was achieved, and full maintenance programmes carried out, in spite of severe depletion of staff through enlistments and transfers to war work—at the end of the year 354 employees of the Council were absent on active service.

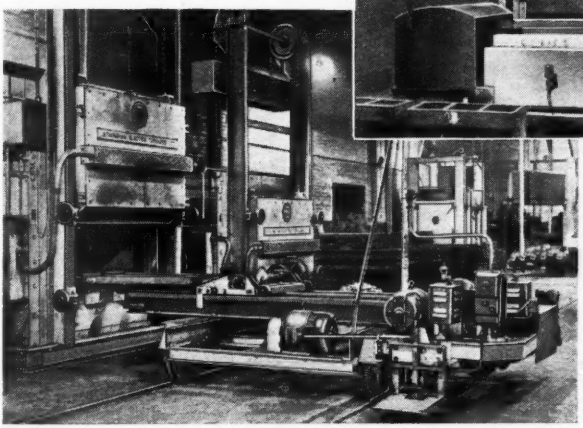
Heat Treatment

Furnace Applications in an Engineering Works

THE story which tells of the interdependence of modern steels and the electric furnace is interesting, first, because of the outstanding part played by melting furnaces in the production of the higher-grade steels, and secondly, because of the more exacting calls for heat treatment made by such steels. Often the reason for using a special alloy-steel is its ability, by virtue of its high quality, to undergo severe machining operations during production, and an essential part of the " workability " is heat treatment. In a large engineering works we recently saw some of the applications of various heat-treatment processes, including carburising, nitriding, oil quenching, salt-bath treatment and annealing.

Carburising is a form of case hardening which leaves the core of the metal comparatively " soft " to permit a certain " workability," although the outside is hard enough to resist severe surface wear. The treatment is undertaken in muffle furnaces in which gear-wheels, for instance, packed in broken charcoal in steel containers, are subjected to heat treatment for many hours at a time. Gases released by the carbon during heating are absorbed by the metal under treatment, with the result that the outer layer of the metal changes in character in such a way that when it is subsequently quenched it becomes extremely hard.





Above: On each half of the base of a nitriding furnace stands a container over which, when full, a bell cover is lowered
Left: A charger runs on rails in front of a line of carburising furnaces

Each of these furnaces is rectangular in shape, the heating chamber measuring internally about 12 ft. long, 8 ft. wide, and 5 ft. high. A charger which runs on rails in front of a line of these furnaces for loading and unloading is equipped with two motors, one for travelling and one which propels the loaded platforms into or out of a particular furnace to which the charger has been lined up. The motors have simple drum-type controllers, and they are fed by a trailing cable from an overhead source, the cable being wound on a spring-loaded drum which takes up the slack cable at any point. The furnace will take, say, about 50 six-inch gear wheels in any one charge. The maximum operating temperature is 1,000 deg. C. and the total loading per furnace is 110 kW. The elements, which are of strip hair-pin construction, are hook-suspended from the refractories of the ceiling, walls and door of the heating chamber. They are supplied at 200 V, three-phase, from a separate transformer for each furnace which is fed from the normal 400-V works

distribution system *via* a 200-A oil circuit-breaker. The elements are automatically controlled within fine temperature limits by means of a potentiometer-type regulator. The regulator is governed by a thermo-couple in the body of the furnace.

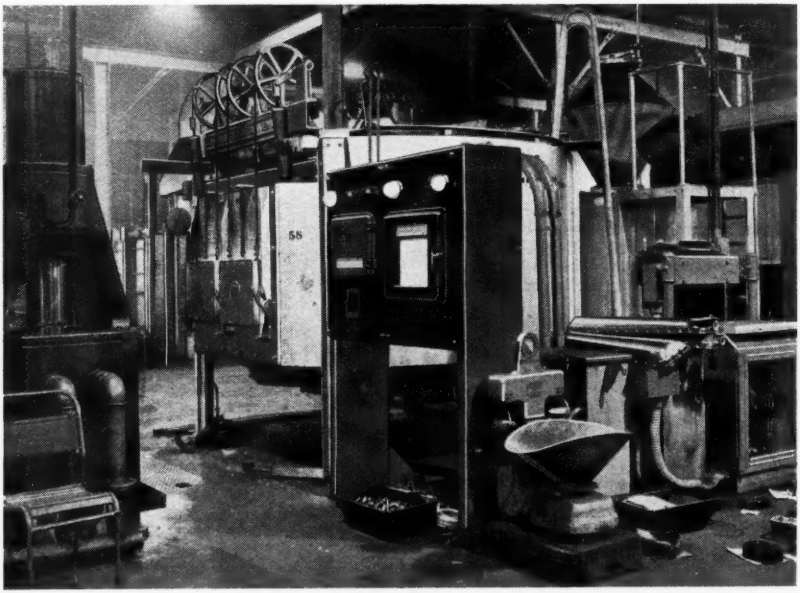
On the vertical sliding door there is a trip switch which, with the safety heat fuse and the regulating instrument, is in series with a contactor controlling the elements, this being, of course, an emergency operating scheme.

Nitriding is another form of case hardening treatment, the hardening effect being brought about by the absorption by the metal of nitrogen which is extracted from ammonia gas in which the metal is treated. The treatment differs from carburising, however, inasmuch as the hardening is complete when the product is removed from the furnace, whereas in carburising a final quenching is necessary. Crankshafts, in particular, are subjected to this treatment, and we saw a number of furnaces specially installed for this purpose.

Each furnace has a movable heating chamber about 8 ft. long, 5 ft. wide and 4 ft. high, which travels along a stationary base about twice its length. On each half of the base stands a container over which, when full, is lowered from a crane an inverted bell cover which is sand sealed at the bottom. After sealing, ammonia is injected into the bell cover and finally the heating chamber is drawn over the container. Thus, while treatment is taking place on one half of the furnace base, the other half is free for cooling, loading and unloading. Each container will hold about 2 cwt. of metal for treatment and the maximum treating temperature is 650 deg. C. The loading is 55 kW per furnace and the supply arrangements are similar to those of the carburising furnaces.

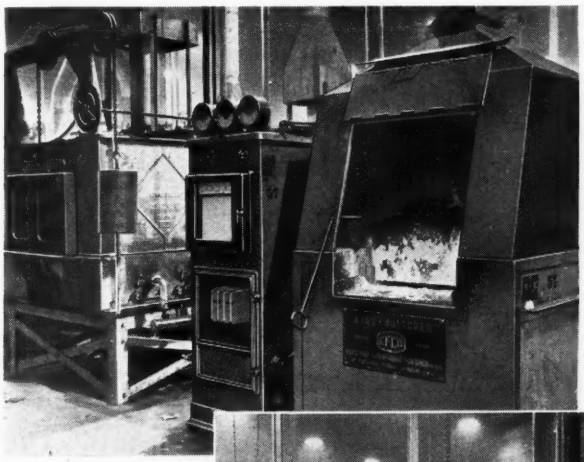
Strip hair-pin elements are suspended from the heating chamber refractories, and to overcome the connection difficulties through the chamber being movable there are heavy flexible cables between a connector on the chamber and a distribution point nearby. Control is by a potentiometer equipment and the ammonia is obtained by producer apparatus on site.

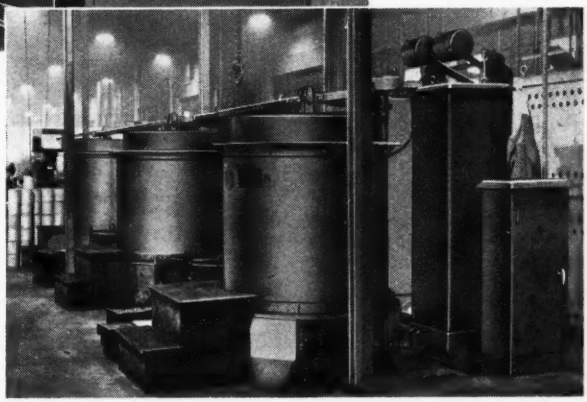
For rather special hardening work we saw a rotary hearth furnace which operates in conjunction with oil quenching equipment. This double-door furnace is used for large type gears which are loaded at the right-hand door, and travel round the heating chamber by means of the rotating hearth. The time cycle is so arranged that when the gears arrive at the left-hand door the correct heat



The time-cycle of the rotary-hearth furnace is so arranged that when the gears arrive at the left-hand door the correct heat treatment has been given ; the quenching gear is seen on the left and charcoal-gas plant on the right

treatment has been given and the product is ready for removal. The operator is warned when a gear is ready by a signal lamp fitted immediately over the door. On removal, the gear is quenched under a press. The operating temperature is round about 800 deg. C. and the furnace works in conjunction with a charcoal-gas plant which is designed to generate about 500 cu. ft. of gas per hour.





Above : The salt-bath furnaces usually work in sets of four, graded in temperature from 170 to 850 deg. C. Right : For the annealing and stress reducing of bearings, etc., there are a number of 20-kW cylindrical air-bath furnaces

For the annealing and stress reducing of such components as bearings and special alloys we saw a number of 20-kW cylindrical furnaces, each of which deals with about ½ cwt. of parts at a time. The elements in this case are of the flat-bar industrial-fire type, arranged round the inner surface of the chamber, which is closed by a split-door at the top. The elements are supplied at 400 V, three-phase, and the control is by means of a potentiometer regulator equipment.

A fan is fitted underneath the base to ensure perfect heat circulation. The operating temperature is seldom more than 200 deg. C., and the furnace is supplied from a contactor in the usual way, with the exception that no transformer is used, the elements being star-connected across the three-phase, 400-V supply.

For the hardening of tools used by many of the factory machines and various high-speed tools there are a number of salt-bath furnaces. Special salts are available to cater for the different temperatures required. The furnaces usually work in sets of four, graded in temperature from 170 deg. C. to 850 deg. C. The furnaces are equipped with electrode heaters which operate at 10 V only, a special transformer serving each furnace. The transformer is controlled in the usual way from a contactor panel ; the secondary is tapped at several points and may be adjusted by the attendant by means of a tap-change switch.

Irish Tidal Power

MR. Frank Gibney, an Irish architect, has made a report to the Department of Industry and Commerce on the possibilities of using tidal power for hydro-electric generation in Eire. Such a scheme he considers to be particularly adapted to conditions in Eire on account of the rugged coast line, providing the equivalent of one mile of marine water front to every seventeen square miles of territory. After examining possible suitable locations he recommends the Shannon estuary as a site for a large power station. Other sites include Castlemaine Harbour, Dingle Bay and Strangford Lock.

Supply Statistics

Commissioners' Returns for 1939-40

PARTICULARS released by the Electricity Commissioners relating to the 578 authorised electricity supply undertakings (including 205 company-owned) for the year 1939–40 show that during that year the number of kWh generated (93·75 per cent. under the direction of the Central Electricity Board) amounted to 26,812 million. With the addition of energy produced by outside sources the total kWh available as gross public supply came to 26,923 million.

After deducting the consumption of auxiliaries (6·25 per cent.), excess of intersales over interpurchases (0·2 per cent.) and losses in transmission and distribution (9·84 per cent.), the kWh sold to 10,564,000 consumers was 22,538 million, of which 8,690 million was used for lighting, cooking and heating, 12,476 million for power, 142 million for public lighting and 1,230 million for traction. The number of staff and workmen engaged totalled approximately 98,000, nearly 9,000 fewer than in 1938–39. Salaries and wages paid were close on £18,600,000.

Revenue and Expenditure

Expenditure charged to capital account totalled £678,656,000 at the end of the period. Items are not available, but the increase on the previous year amounted to over £30,000,000. Revenue received from sale of energy totalled £94,733,000, of which lighting, heating and cooking provided £57,116,000 (1·577d. per kWh), power £33,621,000 (0·647d.) and traction £3,043,000 (0·593d.). Public lighting receipts fell to £953,000 from the £1,636,000 of the year before. Other sources produced a further income of £8,332,000, making a total revenue of approximately £103,000,000.

Working expenses, excluding capital charges, aggregated £57,591,000 (0·613d. per kWh sold), of which £22,239,000 was due to generation. The cost of energy generated and purchased worked out at 0·25d. per kWh sold. Local rates were responsible for £7,892,000 (0·084d. per kWh sold). The remainder was allocated (details not available) to transmission and distribution, management, repairs of meters and wiring work for consumers and maintenance of public lamps. Of the works costs of generation fuel accounted for £17,218,000 (0·154d. per kWh generated), salaries and wages for £2,406,000 (0·022d.) and repairs and maintenance, oil, water and stores for £2,615,000 (0·023d.).

A gross surplus of £48,512,000 was derived by deducting the working expenses from the revenue from working plus £3,038,000 received as interest, dividends and miscellaneous income. Of this surplus £20,005,000 was allocated to interest and dividends (gross), £2,323,000 to income-tax, £26,038,000 to depreciation, reserve, loan repayments, special expenditure and other purposes. This left £147,000 as the net increase in balances on net revenue account.

Fuel Consumption

With regard to fuel consumed, the following table gives results for the past four years :—

Year	kWh generated millions	Increase per cent. over previous year	Coal and coke, thousand tons	Increase per cent. over previous year	Fuel oil, thousand tons
1938	24,372	6·4	14,186	1·1	20·3
1939	26,409	8·4	15,258	7·6	18·6
1940	28,773	8·9	17,517	14·8	25·5
1941	32,349	12·4	19,817	13·1	20·4

For the current year (1942–43) the administrative expenses of the Commissioners are estimated at £55,960. The amount allocated to meet the interest and sinking fund charges on account of standardisation of frequency is £880,000. An estimate has been approved of £159,700 in respect of payment to the Central Electricity Board for Civil Defence measures. These expenses for 1942–43, *viz.*, £1,095,660, represent the equivalent of 18s. 8d. per £100 of revenue obtained in 1941 for the sale of electricity to consumers (excluding bulk supplies) as compared with 17s. 11d. for the previous year.

Economy Specifications

TO effect the utmost economy in the uses of zinc, amendment (PD. 23) to BS. 729 reduces the number of dips allowed for general goods; it is recommended that galvanising be eliminated whenever possible. Amendment (PD.17) to BS. 443 reduces the severity of tests for coatings on galvanised wire. Representations for permission to adhere to the original specification for wire should be addressed to the Director for Wire Rods and Wire Products, Ashorne Hill, near Leamington Spa, Warwickshire.

To reduce the uses of cotton, WE/BS. 1069 restricts to four types the number of ducks that may be employed in the manufacture of belting, both rubber and balata impregnated, for conveyors, elevators and power transmission.

To reduce the uses of tin, four new specifications, BS. 1031–2 and 1072–3, are concerned with two grades of aluminium bronze ingots and castings, including high-tensile grades.

Copies of all these documents are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1.

Grading Protective Devices

An Important Factor in Limiting Supply Failures

By G. V. Harrap, A.M.I.E.E.

CONTINUITY of supply being of greatest importance under present conditions, reliable functioning of protective apparatus is more than ever necessary. Incorrect operation on a fault usually deprives a larger area of electricity than should be affected. Faults are more likely to occur in air-raids and hence the chances of incorrect operation are greater then. Yet it is in air-raids that light should be maintained for the maximum number of people. Moreover, incorrect operation of protective gear increases the time of restoring supply. Time is taken in ascertaining what protective gear has in fact operated and then in finding out which section is faulty. It may be that a feeder between the protection that has functioned and that which should have done so is healthy, but at the time the engineer restoring supplies does not know that.

Grading of protection is necessary on both high- and lower-voltage feeders and distributors, whether on the undertaking's system or on the consumer's premises. Where different types of protection or different makes of the same type are employed, grading may be difficult. Troubles encountered in securing proper grading can be illustrated by comparisons between the current-time characteristics for the more common types of protective apparatus. The problem is not only one of grading different ratings of similar gear; it also includes taking into account different makers' characteristic curves and grading one type of protective gear with that on a different system, *i.e.*, high- and low-voltage protection correlation.

The most common form of protective device for modern switchgear is an overload, inverse, definite-minimum time-limit relay, but many older switches in commission are equipped with time-limit fuses. The three curves in fig. 1, for different makes of relay having the same class of duty, are based upon 100 per cent. current setting and a maximum definite-minimum time-limit of 2 secs. In practice switches are rarely set to operate at such a long time delay. With any shorter delays, the divergencies will remain, but will be somewhat smaller in value, though not in proportion.

On most supply systems there is little need for protection against overloads and the differences between the curves up to about 500 per cent. load are of small account. The main need is to deal with short-circuits, for which the grading is concerned with the portions of the curves in the higher ranges of current. Differences in operating time are small, but to obtain a successful system of grading on the majority of high-voltage feeders, provision has to be made for five or six relays. This means time-intervals of the order of 0.35 sec., while the characteristic curves given by the makers are subject to a tolerance of plus and minus 10 per cent.

On a system with which I am familiar, protection grading was completed just prior to the heavy bombing of London beginning in August, 1940, and extending into 1941. During this period there were nearly 100 high-voltage system faults, and although the consequent changes in feeding arrangements meant a continuous re-grading of sections of the protection, yet there was never an incorrect operation. It was only by taking into account the different characteristic curves of similar types of relays by different makers and the variations in time-limit fuse characteristics that this result was achieved.

Many of the older styles of oil switches are equipped with time-limit fuses to take care of overloads and short-circuits. This applies to both high- and medium-voltage systems, but it is now fairly well accepted that fuses are useless for grading protection for short-circuits. Their most common use would appear to be on lower-voltage switches which

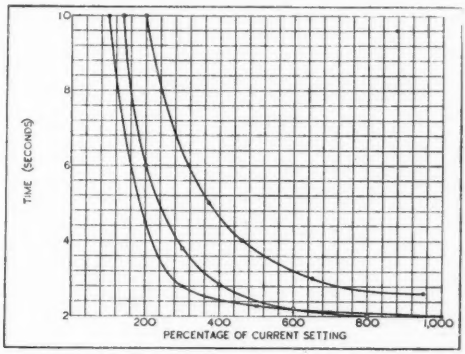


Fig. 1.—Characteristic curves of inverse definite-minimum time-limit relays

control groups of series fused feeders or distributors in either an undertaking's substation or on a consumer's installation.

Plotted in fig. 2 are a series of curves for the normal ratings of time-limit fuses used on switches. Within each current rating there is a family of curves, each of which represents a different maker's characteristic curve for the fuse wire supplied with his apparatus. When an undertaking has a number of different makes of switchgear of different current ratings (which is usual) the difficulty of attaining correct discrimination will be appreciated.

Deterioration plays a large part in the operation of time-limit fuses (unlike the case of relays), since if the fuse wire is subjected to a continuous load of about 50 per cent. of its rating, it will fail eventually. Higher fuse ratings are therefore required than would otherwise be justified. This is especially serious where back-up protection in the same substation or in that supplying the switch controlled by time-limit fuses is of the relay type. It means a higher setting on the latter to compensate for deterioration of the time-limit fuse.

The curves in fig. 2, if projected further, would all assume a small definite time limit. Experience has proved that attempts to grade time-limit fuses by their nominal ratings for handling short-circuits is a waste of time. Under these conditions all sizes blow almost instantaneously.

L.V. Air Circuit-Breakers

The common practice of group switching on medium-voltage circuits, is often achieved with an oil switch, but probably on the majority of systems an air-break circuit-breaker is employed. In fig. 3 are shown the characteristic curves for three makes of 500-A and two makes of 1,000-A circuit-breakers. Again there is great divergence between the ratios of current and operating time, and on overloads the time range is very considerable. It is noteworthy that one make of 500-A breaker has a characteristic curve only slightly dissimilar from another make of 1,000-A breaker.

On short-circuits the time delay of all sizes and makes is very slight because the delay feature is usually an oil-filled dashpot, dependent upon suction for retardation. As the maximum pressure available for delay is 14 lb. per sq. in., the large current flowing on a short-circuit, especially on a medium-voltage system, can produce a far greater effort. Hence any delay is infinitesimal, and the only cure seems to be the installation of a relay. Clockwork mechanism has been tried, but the forces set up are so great that teeth are stripped from gear wheels.

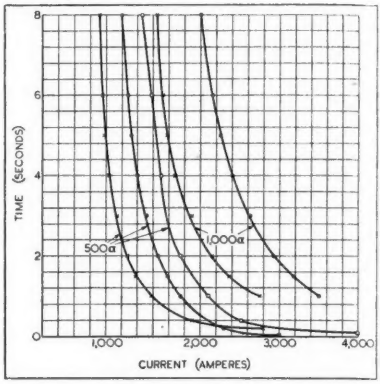


Fig. 3.—Characteristics of air circuit-breakers

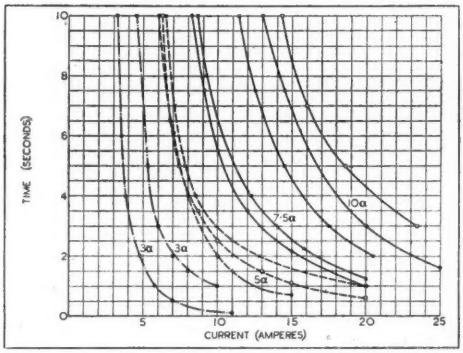


Fig. 2.—Characteristic curves of time-limit fuses

A further trouble in grading protection on this class of switch is the variation in the delay feature itself. Substation temperatures range from about 40 deg. F. to 120 deg. F. The change in viscosity of the oil in the dashpot through such a range is considerable. Fig. 4 illustrates the effect upon time of operation of one of the makes of 1,000-A circuit-breakers of fig. 3. At 1,500-A the circuit-breaker's normal characteristic curve shows an operating time of 4 sec. Because of the temperature range, this time can in practice vary between 1 sec. and 8 sec. and proper grading becomes impossible. It would seem to be fundamentally wrong to mix electrically and thermally affected devices.

Experience with open-type fuses has led users to judge that a fuse will operate at its rated current. In about half a minute a 5-A time-limit fuse will blow at 5-A. On

consumers' premises a 100-A open-type fuse can be expected to operate fairly quickly at that current.

A high-rupturing-capacity fuse, however, is supposed to carry its rated current continuously, though contact heating often sets a

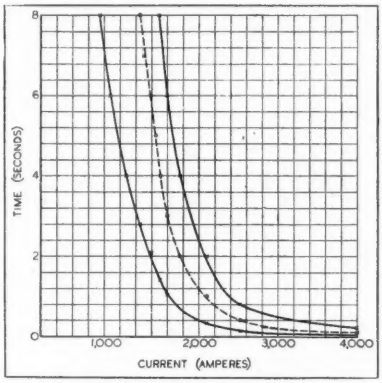


Fig. 4.—Air circuit-breakers, variation of operating time with temperature (range 40 to 120 deg. F.)

lower limit. To ascertain the minimum fusing current a factor has to be used, varying from 1.6 to 2.0, but even then the time taken is not comparable with that of the open-type fuse. In addition, there is again the divergence between overload and short-circuit performance, and from the curves in fig. 5, a 300-A h.r.c. fuse requires about 800 A to achieve a reasonable operating time. On short-circuits it would appear, from a grading point of view, that all fuses operate practically instantaneously. It is, however, possible to obtain grading between fuses of this type, if their ratings are not too close together, but difficulty arises in matching their characteristic curves with those of associated apparatus.

Fig. 5 has been drawn with the latter aspect in mind and covers two variations of a normal installation. The curves should be examined first by considering an installation consisting of a 300- and a 400-A h.r.c. fuse in series, fed through a 500-A air-break circuit-breaker, which derives its supply through a 6,600/400-230-V transformer controlled by a high-voltage oil switch having time-limit fuses operating from 60/5-A current transformers.

The two h.r.c. fuses should discriminate satisfactorily, but the makers' curves should be consulted for much smaller operating times than are here shown. It is evident, however, that the 400-A fuse will never get an opportunity to operate, since the 500-A circuit-breaker will open first. This is especially so when consideration is given to the failure of oil-filled dashpots to handle heavy currents. The time-limit fuse on the high-voltage switch should not blow with a fault on the installation outlined, but it is possible that deterioration might result in unwanted operation at the time of the fault or at a later date when only load current is flowing.

A further example may be taken of a typical installation of a 400-A and a 700-A h.r.c. fuse, a 1,000-A circuit-breaker and a high-voltage oil switch controlled by an i.d.m.t.l. relay set at 100 per cent.–0.15 TM. on 60/5-A current-transformers. As with the previous case, the current imposed upon the high-voltage protective device has been referred to the equivalent of that on the medium-voltage system. In the present case every medium-voltage fault will trip the main 400-V circuit-breaker controlling all feeders and distributors. The operation of the

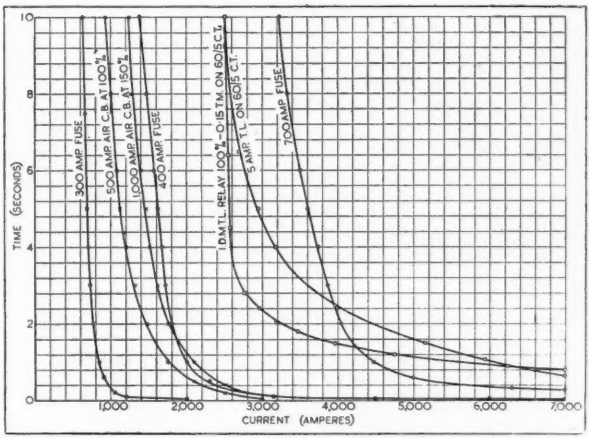


Fig. 5.—Grading of medium-voltage h.r.c. fuses and air circuit-breakers and high-voltage oil circuit-breakers. (All curves have a tolerance of ± 10 per cent.)

700-A fuse would be problematical even if the circuit-breaker were omitted, since the majority of relays controlling transformers are set with a time-multiple of 0.05. Such a

fuse has never blown under such conditions in my experience, and with both relay and time-limit protection the high-voltage oil switch has had the duty of clearing the lower-voltage fault.

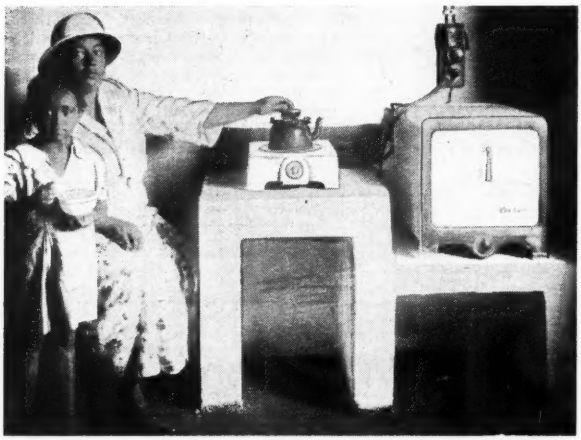
Protective gear with the same ratings for the same class of duty should have inter-changeable characteristics in operation, no matter who is the maker. Just as important is the need for related apparatus to have characteristics that can be graded one with another. There is a limit to the field within which this can be achieved, for short-circuits cannot be allowed to remain on a system too long. The effect of system instability will have to be taken into account and normally all grading must be done between zero time and 2 sec. The latter will be the maximum limit on C.E.B. switches, so that those of the undertaking will have to be even lower. Such a correlation would have a most beneficial effect upon new installations. In modernising old substations there will sometimes be the obstacle that still serviceable old gear cannot economically be scrapped just because of difficulty in correlating the protective device on it. Hence in thousands of existing installations, this jumble of characteristics and ratings is likely to remain.

Electricity in Madagascar

Small Water-Power and Steam Plants

IN Madagascar, the capital of which was occupied by British forces last week, electrical development has been largely confined to the last decade. Distribution is in the hands of two companies—the Société d'Electricité et d'Entreprise, which supplies the north of the island, including Diego Suarez, and the Société d'Electricité et des Eaux de Madagascar, which operates on the central plateau, particularly at Antananarivo, Antsirabe, Fianarantsoa and the ports of Tamatave and Majunga.

Diego Suarez, in the north, and Majunga, in the centre, are supplied by steam plants and the rest of the country by hydro-electric stations. Up to 1930 the distribution system of the capital, Antananarivo, was the only one in existence, but since then electric lighting has become general and before the war efforts were being made to develop the use of domestic electrical apparatus, but the habits of the natives, low wages and the availability of cheap firewood in the temperate parts of the upper plateau have been serious obstacles. In Diego Suarez, where the supply was inaugurated in 1931, only three small hot-plates were in use up to the end of 1935. Since then, however, an educational campaign conducted by the supply company has effected an improvement, and by the beginning of 1938 the town had at least one all-electric establishment, the hotel Chez François, where the electric services included heating, hot-water and cooking.



The kitchen of a Madagasy home with cooker and boiling plate

Electric refrigerators have proved most popular generally on account of the tropical climate, and at the beginning of 1938 there were 233 of them in use.

Water-heaters, used mostly on the plateau, numbered 177. In the city of Antananarivo all-electric establishments include a block of ten flats.

Industrial Law for Executives

THE Industrial Welfare Society's correspondence course in industrial law has proved of great benefit to a large number of persons who during the war have taken up executive positions in industry but could not afford to make a prolonged study of the subject. The course consists of six lectures, each of which can be read in 1 to 1½ hours, and students are invited to submit any questions they wish on the lectures. The lectures are normally sent weekly, but they can be sent all at once or at longer intervals at the wish of the individual student. Particulars can be obtained on application to the Secretary, 14, Hobart Place, London, S.W.1.

Motor Troubles

Elusive Faults and Hidden Defects

By "Rotor"

A FOUR-POLE, compound, 30-HP motor recently would not function as a dynamo, although it had run inverted quite successfully on a previous occasion. The connections were checked, the commutator cleaned, brush pressure increased, and the shunt field circuit was tested for continuity with a "Megger." As it seemed likely that the machine had lost its residual magnetism the field was remagnetised from a low-voltage supply, but the machine still refused to build up any voltage. Eventually the "Megger" revealed an open circuit in one shunt field coil and this was repaired.

Even then the machine would not build up although it would run as a motor at the correct speed. Evidently residual magnetism was present as the dynamo generated a very small voltage. The resistance of the load circuit was, therefore, reduced by switching on a motor fed from the dynamo; when the motor started the dynamo built up to normal voltage. The dynamo voltage was maintained when all the load was switched off but, after stopping the dynamo, it refused to build up again until the motor was switched on. Finally, after repeated tests of the shunt field circuit, a doubtful field coil was opened up. It was then found that corrosion had caused a minute open-circuit at one point of the winding and the resultant arcing had carbonised a small patch of the insulation.

Evidently the supply voltage, when operating as a motor, had been sufficient to pass normal field current across the carbonised point, but the resistance of the fault was too high to permit the passage of sufficient current to build up the field, when the field winding received only the small voltage due to residual magnetism. Closing the motor circuit allowed the machine to build up to a fairly high voltage on the series field coils, this being sufficient to pass current across the carbonised point, after which the dynamo built up normally.

Shaft Unbalance

The following three cases illustrate the effect of electrical unbalance on motor circuits. A 30-HP, three-phase, slip-ring motor was found to be throwing out sparks between the rotor and stator, following a report that the starter frequently tripped out and the motor had to be assisted manually at starting. When the machine was dismantled marks were seen on the rotor at one point where it had rubbed on the stator, although the bearings were not worn and the normal clearance between the rotor and stator was 0.025 in. One of the joints of the rotor conductors had become unsoldered, and the consequent open circuiting of a section of the rotor had caused sufficient magnetic unbalance to deflect the shaft and allow the rotor to make contact with the stator. The defect was put right by repairing the open circuit and trimming up the core plates.

Electric motors are essentially reliable machines, not usually expected to need much maintenance; indeed they have been known to suffer from over-attention rather than neglect. Of course, failures do occur in service, for reasons that sometimes seem obscure until they are revealed by reasoning backward from effect to cause

A second-hand 35-HP, squirrel-cage, induction motor that was used occasionally to drive machine tools caused vibration but not much trouble until it became necessary to operate continuously on full load, when it became a source of much annoyance to persons working in the vicinity. The foundations were satisfactory, but the current input to each phase of the motor was not quite equal. Investigation revealed that one coil of the stator winding had been connected in reverse, apparently at the time of some previous repair. The connections were corrected, after which the motor worked quite smoothly.

A 2-HP, squirrel-cage, induction motor driving a small mill stalled frequently on load, which had not been increased in any way, the motor having performed the same duty for years without previous trouble. The fuses were intact and the starter connections and contacts were in order. The motor worked quite normally when tested by the electrician, but trouble occurred when a nearby 10-HP, squirrel-cage motor was in use, the two being fed from the same distribution box. Examination of the combined switch and fuse box controlling the distribution box showed that the trouble was due to a badly burnt contact and blade. Apparently the voltage drop at the faulty contact was sufficient to reduce the pull-out torque of the motor when the contact was loaded with the current for both motors. Curiously enough, no trouble had been reported on the 10-HP motor, probably owing to its having a very even load of high momentum.

A 2-HP, 200-V, two-phase, squirrel-cage motor refused to start, merely humming when

the switch was closed, although both the motor and driven machine were quite free and the bearings not worn. It was suspected of single-phasing; after examination of the switch contacts, the voltage was checked correct both from each phase to neutral and between phases. The windings were tested for continuity and insulation resistance and the motor was dismantled for internal examination, without any defect being found. Surprisingly, when the motor was removed to the repair works it started and worked quite normally.

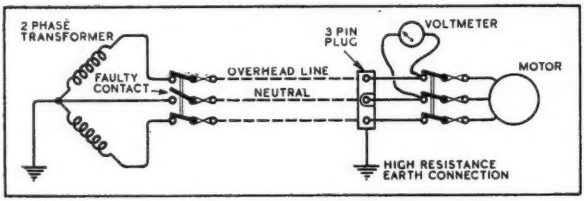


Fig. 1.—Faulty two-phase motor circuit

A check of the supply circuit revealed the following three faults. The motor was fed through a three-pin plug and the centre socket, which was connected to the neutral, was mounted on a lug of the earthed case of the plug, giving multiple earthing of the neutral. The earth electrode for the plug case had a very high resistance to earth. The centre blade of the main switch-fuse at the transformer house was not making contact. The result of the defects (fig. 1) was equivalent to connecting a high resistance in circuit with the neutral between the motor and supply, which had a negligible influence on the reading of the high resistance voltmeter used. The effect of the starting current passing through the high resistance, however, would be to cause a high-voltage drop at the earth electrode and so upset the relationship between the two phases, hence the single-phasing effect.

Generator Paralleling

The DC motor load in a small foundry was carried by two generators, one of 60 kW driven from the main steam engine, and a 35-kW motor generator. The two machines would not work in parallel, so the switchboard was designed with double-pole change-over switches to enable any motor to be fed from either dynamo as required. It was the practice to throw over the change-over switches without stopping the motors. All went well until the motor-generator was taken out for repair of the field windings of the dynamo. On its return everything appeared satisfactory until it became necessary to remove one of the motors. Throwing over the change-over switch caused a flash and the fuses for the motor and the 60-kW dynamo were melted. They were replaced and, as everything seemed in order, the motor was started again, this time being fed from the 60-kW dynamo, and worked normally until it was necessary to transfer this load back to the motor generator, when the same thing occurred again.

The cause of the trouble was that the polarity of the dynamo had been reversed during repair. This had no effect on the operation of those motors started from the dynamo, since the current through both the field coils and armature would be reversed, and the back E.M.F. of the motors would be reversed. During the instant that the change-over switch was open the momentum of the

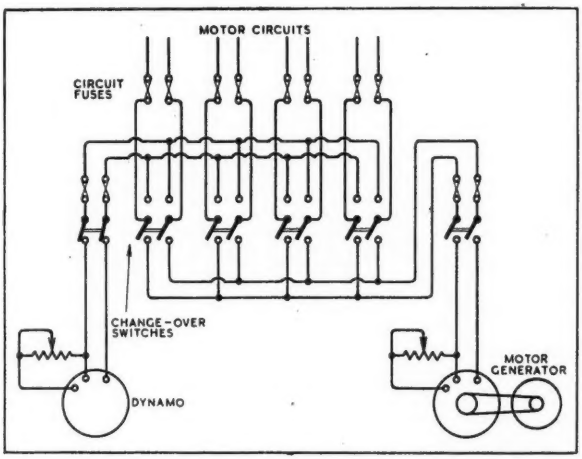


Fig. 2.—Switchboard connections for alternative supply

motor drive maintained the back e.m.f. as the terminal voltage of the motor. This, however, was of opposite polarity to the other dynamo so that when the switch closed on the other side (fig. 2) the dynamo was short-circuited through the motor at practically twice normal voltage.

Push-button "Snags"

A 2-HP, DC motor was used to drive a drilling machine, the motor being controlled by an automatic starter with push-buttons on the driven machine. When the motor was employed elsewhere without remote control the electrician short-circuited the terminals A and B (fig. 3) so that it would start when the double-pole switch was closed. But the solenoid coil of the starter got very hot, the measured temperature on the outside of the coil being 220 deg. F.

Normally, pressure on the starting button caused the solenoid coil to be connected across the mains, so that the moving contact rose to cut out the starting resistance step by step. When the moving contact touched the first fixed contact D the solenoid would continue to operate after release of the starting button, the solenoid circuit being completed through the contact D and the auxiliary contacts C. At the end of the stroke of the solenoid plunger the contacts C were opened to connect the economy resistance in circuit with the solenoid, this coil requiring less current to hold in the running position than to move from the "off" position. The coil was rated to carry the full current for the brief starting period only.

Actually the short-circuiting of the "start" button (terminals B) had permanently short-circuited the economy resistance so that the coil was carrying its maximum current all the time. The trouble was overcome by connecting the economy resistance to the opposite supply pole of the coil.

A somewhat similar type of starter was used to control a motor-driven pump, the solenoid coil in this case being energised by means of a float-operated switch in a tank served by the pump. The behaviour of the motor was very erratic; it would start normally, but when it reached full speed it would slow down to about half the normal speed, then accelerate to full speed again and so on. This cycle of operations occurred continuously and the pump supplied very little water.

The cause of the trouble was an open-circuited economy resistance connected in the solenoid coil circuit. As the float switch closed, the solenoid coil was energised and commenced to start the motor. At the top of its stroke the raising of the auxiliary contacts connected the economy resistance in circuit and, since this was open-circuited, the coil was de-energised and the plunger fell, the starting resistance being rapidly connected in circuit. As the plunger fell, the auxiliary contacts were closed and the coil was re-energised so that the plunger rose again. The armature resistance coils in the starter had become overheated due to their having little or no cooling period and would have been burnt out if the trouble had not been noticed.

The automatic starter was used to control a small lift operated by a three-phase, slip-ring motor and controlled by "up" and "down" push-buttons situated in the lift

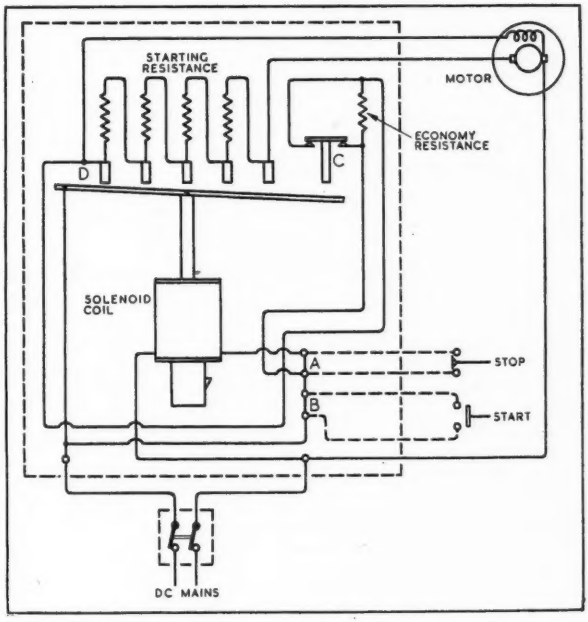


Fig. 3.—Faulty connections in DC automatic starter

cage and on the various landings served. Considerable inconvenience was caused owing to the fact that when a passenger was travelling up it was possible for another person on one of the landings to gain control of the lift by pressing one of the " down " buttons, or *vice versa*. There were no electrical interlocks, but a mechanical interlock was fitted (fig. 4) consisting of a pivoted lever between the armatures of the two contactors. Under normal conditions the magnetic force between the armature and core in contact on the closed contactor was much greater than that between those of the open contactor, due to the large air gap, so that the first contactor to be closed remained in that position even when the second contactor coil was energised.

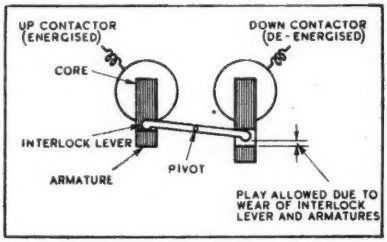


Fig. 4.—Defective lift contact

Actually the interlock lever and armatures had worn slightly so that the lever did not bear on both armatures. Consequently when one contactor was closed, energising the second contactor caused the armature of the contactor to move. The momentum gained by the armature before it came up against the interlock lever was sufficient to force the first contactor to open. It was necessary to fit a new interlock lever and to smooth up the contacts of both contactors, which had been burnt owing to the heavy current passing when reversing the motor against the starting current and at full speed.

Fuel Economy Conferences

Can Rationing be Avoided?

MANY people regard the "Target" scheme as a half-way house to rationing. Referring to this at a conference of engineers and members of staffs of electricity undertakings at Manchester recently Mr. V. W. Dale, business manager of E.D.A., said he had been authoritatively informed that this conception of the scheme was fallacious. In his view the Government did not want rationing if it could be avoided.

The conference, as briefly reported last week, was presided over by Mr. J. Harwood Lumsden, chief engineer of the Stalybridge, Hyde, Mossley and Dukinfield Joint Transport and Electricity Board, and was attended by Mr. Gordon Macdonald, Regional Controller for the North-West Region.

In the course of his address Mr. Dale expressed the view that if the Government was forceful and if the publicity campaign was supported by a personal appeal which only they in the gas and electrical industries could adequately provide, something approaching the target economy figure of 10,000,000 tons of coal could be achieved. He rejected the view that the public would not respond, and as an illustration of what had already been done he quoted figures supplied by the engineers of seven or eight undertakings. Thus, in one large borough in the south of England with a population of 300,000 records during a week in August at two substations supplying purely residential areas showed reductions in output of 19.5 and 24.2 per cent., the totals being 188,140 and 38,890 kWh against 233,770 and 51,280 kWh last year. In a small county town in the south the output for the first 24 days of August was down by 209,000 kWh, or 10 per cent., the maximum demand at 12.30 p.m. being 1,100 kW below last year's figure. In the case of a rural area over the border a cross-section of farms, hotels, public buildings and shops for the June quarter—well before the present intense publicity campaign got going—revealed a 10 per cent. reduction on farms, 10 per cent. in hotels, 19 per cent. in public buildings, 25 per cent. in offices and 26 per cent. in shops ; altogether, taking 18,500 premises, the average reduction was 18 per cent. While he did not think that these figures should be taken too seriously, he did suggest that they provided an answer to those who argued that there was no alternative to compulsory rationing.

In his view it was really a question of using their peacetime methods and machinery and wartime resources with the objective in reverse—selling economy as forcefully as they had sold electricity.

He mentioned what E.D.A. had already done, and described various ways in which undertakings could assist in spreading the economy idea. Other useful suggestions were made by speakers in the ensuing discussion.

Fuel Saving in Industry

Ways in which the consumption of fuel in industrial establishments could be reduced were discussed at a meeting last week between the Fuel Efficiency Committee of the Ministry of Fuel and Power and representatives of over thirty trade associations. The importance of the appointment of " fuel chasers " in factories was emphasised and it was impressed on those present that these officials should be given sufficient status and authority to make them effective. Methods of gauging fuel consumption in relation to production were discussed and the institution of bonus schemes for workmen as a means of encouraging economy was proposed. The Ministry's scheme for training fuel efficiency officers and boiler-house attendants was said to be progressing well.

PERSONAL and SOCIAL

News of Men and Women of the Industry

OWING to the changed conditions arising out of the war and the many calls upon his time in other directions **Sir Herbert Williams**, M.P., has found it necessary to resign his position as Executive Director of the Incorporated Association of Electric Power Companies.

Sir Herbert Williams has been Conservative Member for South Croydon since 1932 and represented Reading from 1924–1929. In 1928–29 he was Parliamentary Secretary to the Board of Trade. He was educated at Liverpool University and holds the M.Sc. and M.Eng. degrees. After serving an apprenticeship with Siemens Bros. Dynamo Works, Stafford, he held positions as marine engineer with Mr. L. A. Smith, consulting engineer, and as electrical engineer with Sir John Norton Griffiths, Bt., on contract work. From 1911 to 1928 he was secretary and manager of the Machine Tool Trades Association and during the last war he was secretary of the Machine Tool Department of the Ministry of Munitions. He acted as joint secretary of the Engineering and Shipbuilding Hours of Labour Investigation Committee in 1920–22 and was Director of the Empire Industries Association in 1926–28.

Sir H. Williams

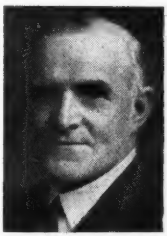
Mr. F. Boyes, manager of the Birmingham district of the General Electric Co., Ltd., retired on September 30th, and from that date the management has been taken over by **Mr. N. M. Hill**, M.I.E.E. Mr. Boyes has been manager of the Birmingham area for thirty-three years, but he first joined the company in London in 1896 and served in several of the sales departments. He was, for some time, in charge of the Union Street Works and later went to the Peel Works, Salford.

Mr. F. Boyes

Mr. N. M. Hill

Mr. Hill, his successor, has been assistant manager at Birmingham since 1927. His engineering apprenticeship was served with a firm of consulting engineers in Birmingham, part of which was spent at the Witton Engineering Works. He joined the G.E.C. in 1906 and after four years on the erection and testing staff at Witton, and later as sales engineer at Newcastle and Birmingham, he left the G.E.C. and went to the United States to gain further experience. He served during the last war in the R.F.C. and rejoined the G.E.C. in 1918 as branch engineer first at Liverpool and then at Manchester until 1927, when he became assistant manager at Birmingham.

Mr. R. F. Smith, J.P., who, as we reported in our issue of September 18th, is retiring in January next from the position of general manager of the Glasgow Corporation Transport Department, has been with the Department (apart from two years' service in the South African War) for over fifty years. His service with the Corporation commenced in 1894, when, under the managership of the late Mr. J. Young, the undertaking was transferred to the Corporation. The early part of Mr. Smith's career was spent on the accounting side and he held the position of accountant for over twenty years, during which, in 1917, the undertaking became debt free for the first time. During his period of managership the debt was redeemed for the second time, in 1941. From 1927 to 1937 Mr. Smith was traffic superintendent and since 1937 he has been general manager. In addition to his duties as manager of the transport undertaking, Mr. Smith is Transport Officer, Civil Defence Services. He is a member of the Institute of Transport and is on the Council of the Scottish Section. He is also on the Councils of the Municipal Passenger Transport Association and the Scottish Road Passenger Transport Association.



Mr. R. F. Smith

Mr. E. R. L. Fitzpayne

Mr. E. R. L. Fitzpayne, B.Sc., who will succeed Mr. Smith as general manager, is thirty-eight years of age. He was educated at George Watson's College, Edinburgh, and studied engineering at the Heriot-Watt College and Edinburgh University. From 1925–26 he was test room assistant with the Scottish Central Electric Power Co., and later served an apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd., by whom he was subsequently

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appointed junior engineer in the Traction Control Department. In 1930 he was appointed assistant engineer in the Edinburgh Corporation Transport Department, and four years later took up the position of general manager and engineer of the South Shields Corporation Transport, where he was responsible for plans to convert the tramways to trolley-buses. He returned to Edinburgh in 1935 as deputy general manager of the transport undertaking, and in 1938 joined the Glasgow Transport Department as deputy general manager. In 1931 he was awarded the Students' Premium of the I.E.E. for a paper on modern tramway rolling stock. He is a member of the Institutions of Electrical and Automobile Engineers and of the Institute of Transport.

Mr. H. Clarke, chief generation engineer to the Fulham Electricity Department, has resigned to take up a position with an electrical engineering concern in the North of England. Mr. Clarke entered the service of the Department in 1928, and when the construction of the new Fulham power station was commenced he was appointed by theCouncil to be resident engineer during its construction and equipment. He was temporarily released from his then position of constructional engineer to take up the appointment, and on completion of the extension he was reinstated in the Department, subsequently becoming chief generation engineer. With Mr. W. C. Parker, the borough electrical engineer, he was largely responsible for the carrying out of the work at the new power station. The Fulham Council has accepted his resignation with regret, and is to give him a testimonial under the seal of the Council.

Mr. H. Clarke

At the September meeting of the B.E.A.M.A. Council, **Mr. E. S. New,** joint managing director of the D.P. Battery Co., Ltd., was elected a vice-president of the Association. Mr. New joined the B.E.A.M.A. Council in 1911, and has been an active member continuously since that date. He served as chairman in 1936-37, and has acted as vice-chairman for three periods.

Mr. E. Nicklin, who is retiring from the Sheffield electricity undertaking after twenty-six years' service, was presented last week with the cost of a large greenhouse as a token of appreciation from his colleagues.

At a meeting on September 24th, the Stoke-on-Trent City Council decided to retain the services of its electrical engineer, **Mr. H. L. Mills,** for a further period of twelve months.

Mr. R. F. Mair has been appointed secretary of the Edison Swan Electric Co., Ltd., and of Edison Swan Cables, Ltd., with effect from September 16th.

Mr. W. J. Waterman, governing director of Philips Lamps (Australasia) Pty., Ltd., has retired for health reasons. He has been associated with the Philips interests for twenty-four years, and took over control of the Australian companies in 1939. **Mr. N. F. Leddy,** who has been managing director of the Egyptian branch for the past five years, is taking over control of the Australian company.

Mr. F. H. Mann, M.I.E.E., H.M. Electrical Inspector of Factories, Birmingham Region, has been appointed Deputy Senior Electrical Inspector of Factories in succession to the late Mr. A. J. McColgan. He will be succeeded at Birmingham by **Mr. A. M. Perry,** A.M.I.E.E., Electrical Inspector of Factories, as from October 20th.

The Minister of Supply has appointed **Mr. D. M. Moffat,** of Tube Investments, Ltd., to be Deputy Controller of Inspection Administration in the Ministry of Supply.

Mr. G. Bowman who has been elected a member of Carlisle City Council, is an electrical engineer and a director of Thomson and Sons, Ltd., Carlisle. He is also hon. secretary of the Carlisle Branch of the E.C.A.

Mr. J. H. Bryan, consumers' adviser in the St. Pancras Borough Council Electricity Department is retiring on superannuation on November 30th, after over thirty-three years with the Council.

Obituary

Mr. H. R. Wiltshire, cable engineer at the Manchester branch of Siemens Electric Lamps & Supplies, Ltd., died on September 24th, at the age of fifty-seven. He had been with Siemens for 34 years.

Mr. C. J. Lund.—The death has occurred at Londonderry, of Mr. Charles J. Lund, who for twenty-eight years was assistant electrical engineer of the Londonderry electricity undertaking from which post he retired a few months ago because of failing health. Mr. Lund was a native of Southport where for two years he was assistant mains engineer to the Corporation. In 1913 he was appointed technical engineer in the West Hartlepool Electricity Department, and later became assistant electrical engineer of the Inverness undertaking.

The late Mr. John Wright

Mr. J. Wright.—We regret to record the death of Mr. John Wright, managing director of the General Cable Manufacturing Co., Ltd., which occurred suddenly on September 21st at the age of fifty-six. Mr. Wright had been associated with the company for many years and had been managing director since 1915. Under his direction the company expanded rapidly and reached a prominent place in the industry. He was a member of the committee of the Cable Planning Organisation.

Mr. J. F. White.—The death occurred on September 1st of Mr. J. F. White, former mains superintendent in the Fulham Electricity Department. Mr. White was in the service of the Council from 1901 to 1937, when he retired on superannuation.

Industrial Locomotives

Four English Electric Types

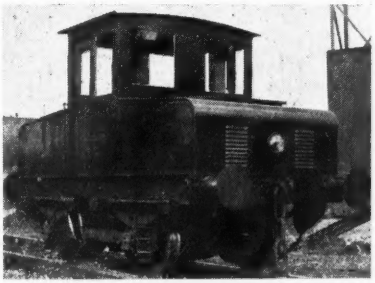
A GENERAL utility electric locomotive for standard-gauge lines which is being increasingly used in industry is the two-axle type with central cab, a number of which have been built by the English Electric Co. It is suitable for battery or overhead line operation, or for a combination of both ; it can be built to individual requirements and ranges in weight from 12 to 24 tons.

Particulars of four recent English Electric locomotives are given below. The first works with combined battery and trolley and is the second of its kind to be supplied to the Derbyshire and Nottinghamshire Electric Power Co. through Balfour, Beatty & Co. Two, battery driven, have been made for the Ayrshire Electricity Board and Swindon Corporation and the fourth, operated from an overhead contact wire only, has been supplied to the Fairfield Shipbuilding Co.

All these locomotives are equipped with two standard-type traction motors, driving through single-reduction gear, one to each axle. Control is effected from the hand-operated drum-type controller in the central cab which provides series-parallel operation of the motors. The general characteristics of these locomotives are given below :—

	Derby & Notts Co.	Ayrshire	Swindon	Fairfield
Weight (tons)	20	20	14	22
Voltage (line)	300	–	–	500
Voltage (battery)	220	250	200	–
Battery capacity at 5 hr. rate (Ah)	294	252	224	–
Horse-power	68	54	31	150
Max. tractive effort lb.	11,000	11,000	7,500	12,000

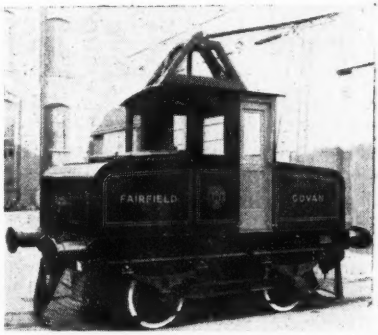
Mechanical brakes are operated by a handwheel inside the cab. The brake blocks



Fourteen-ton battery-operated locomotive

are of cast-iron, one block to each wheel. In addition, the controller is arranged to provide electric rheostatic braking, which is very useful where the locomotive must hold a heavy train while running down a gradient.

On battery locomotives, the battery is housed in the two end compartments which are painted on the inside with acid-resisting paint and provided with ventilating louvres cut in the end plates. The covers are rain-



Overhead contact model

proof and have cowled openings for ventilation of the compartment. A special method of mounting enables the covers to be swung over the end of the compartments to give a clear opening for inspection or removal of the battery. The battery cells are mounted in crates wedged into position.

For locomotives operating from an overhead contact wire, a variety of means for current collection are available, *e.g.*, pantograph, bow-type collector gear and trolleys. Only the last method with two trolleys can be used with an insulated return for the overhead system.

The combined battery and trolley locomotive is arranged so that while standing under the overhead line, the battery is charged automatically. Plain battery locomotives are provided with sockets fitted on a switch-panel inside the cab to which the charging supply can be plugged by means of flexible cable.

Magnetic Scavenger

TYRE conservation at the Southern California Edison store and warehouse yards is aided by a 2,000-lb. magnet, suspended six inches above ground at the rear of a heavy truck. Two petrol motors operate a pair of generators to feed the magnet, which exerts a 600-lb. pull. In a single day a 50-gal. drum of junk, weighing 530 lb., was secured from eight acres of Edison roads, states *Electrical West*. A " magnetic run " over an area which appeared clear of sharp objects netted 10 lb. of nails.

COMMERCE and INDUSTRY

Minimum-Charge Decision. Croydon Showroom Costs.

Fuel Economy Measures

THREE "General Directions" under the Control of Fuel Order, have been made by the Minister of Fuel and Power, all of which came into operation yesterday (Thursday). Two of the Directions deal with central heating plants and it is provided that no fuel is to be consumed for this purpose, except under written permit, until November 1st. A plant supplying both heating and hot-water may be used for hot water only.

As from October 1st, there is a general prohibition upon the starting-up or refuelling of central heating and hot-water plants between 9.30 p.m. and 6 a.m. except under permit or where the majority of the staff of office premises are on duty during the night. The directions apply only to non-industrial premises (excluding hospitals and similar institutions) and cover blocks of flats and residences containing more than ten furnished rooms. Relaxations will be made in the event of abnormal weather conditions whether local or general.

Maximum standards for the interior lighting of shops, restaurants, theatres and other public buildings are specified in the third Direction. For the first two classes the general maximum is 1½ watts per sq. ft. in salerooms, dining-rooms and kitchens; elsewhere in these and the other premises mentioned it is 1 watt.

In order that electricity consumers shall not be encouraged to use more than is necessary an Order has been made under the Defence Regulations suspending the operation of minimum quarterly charges. As an alternative undertakings will be permitted to charge a minimum of 25s. a year, whether electricity to that value is consumed or not. The Order will not apply until after the next meter readings in the majority of cases. Provision is made for consumers on two-part tariffs to change over to flat rates if they consider it advantageous to do so.

In the Eastern Command there are to be two fuel-less days a week (Sunday and Wednesday) in all units and establishments except hospitals and reception stations. It is thought that by this means a saving of 20 per cent. in fuel consumption (including electricity) can be made.

Fuel Economy Propaganda Criticised

Suggestions sent to the Dundee Corporation Electricity and Gas Committees for securing economy in fuel were criticised last week. The convener of the Electricity Committee said when one read the brochure sent out by the Electrical Development Association it made one wonder where the economy came in.

After remarking that the whole thing was very much overdone, the convener said the department was quite prepared to run a campaign in the showroom—without a luncheon. The Lord Provost supported the convener's proposal to proceed on limited lines and this was agreed to.

Croydon Electricity Showrooms

At Croydon last week there was a revival of the criticism regarding the amount expended on the Corporation's new electricity showrooms when the Electricity Committee asked for sanction to take £28,415 from its reserve fund for the completion of the building. The estimated cost of the showrooms was £135,200 and the work was commenced just before the war. The Committee reported last week that the total cost, mainly on account of war conditions, would be £178,415.

Standard Contract Prices

A supplement to the Standard Schedule of Prices issued by the Ministry of Works and Planning (Central Council for Works and Buildings) includes rates of payment for sundry works in connection with sanitary plumbing, water mains, heating and electrical installations. The rates include for working to the convenience of the specialist contractors and for making good after the fixing of pipes, etc. They cover such work as the cutting of holes in brickwork and other materials and the making good of surfaces.

War Risks Insurance

The Board of Trade states that it has reason to believe that a number of traders and firms who are required to insure their stocks or equipment under Part II of the War Risks Insurance Act, 1939, or Part II of the War Damage Act, 1941, as the case may be, are failing to comply with their statutory obligations by either not insuring at all or insuring for a sum considerably short of the full value for which the law requires them to insure.

A number of prosecutions have recently been instituted by the Board against persons who have failed to comply with their obligations and the Board warns traders that it will not hesitate to enforce the provisions in question wherever necessary.

Cost-of-Living Index

Mention is made in the September *Electrical Trades Journal* (E.T.U.) of requests from branches for the negotiation of better wages in the electrical contracting industry. It is said that in almost every instance the letters received protested against the Ministry of Labour cost-of-living index as not being a true reflex of the cost of living.

The *Journal* agrees with this view recalling that the index is still based on the very different conditions prevailing in 1904. It is realised that the necessary investigation with a view to revising the arrangements cannot be undertaken at present but it is maintained that it should be one of the immediate post-war tasks.

Galvanised Wire for Cables

As a means of reducing the consumption of zinc limitations are being placed upon the production of galvanised wire. The Non-Ferrous Metal Control will not issue raw materials licences for the purpose after September 24th, except for special purposes. The latter include the manufacture of electric cables. Fully galvanised wire may be produced and supplied in

cases where its use is specially authorised by the Cable Planning Officer of the Ministry of Supply. Wiped galvanised wire may be produced and supplied for all types of electric cable and for telephone, telegraph line and earth wires (single wire).

As an alternative to wiped galvanised wire, electro-galvanised wire may be produced and supplied for the specified purposes provided the maximum coating of zinc does not exceed by more than 2½ per cent. the following weights for the stated diameters of stripped wire:—0.014 to 0.073 in., 0.15 oz. per sq. ft.; 0.074 to 0.127 in., 0.30 oz., per sq. ft.; 0.128 in. and thicker, 0.40 oz. per sq. ft.

Applications for the use of galvanised wire in exceptional cases must be sent by the users to the Iron and Steel Control, Director for Wire Rods and Wire Products, Ashorne Hill, nr. Leamington Spa, Warwickshire. Applicants must state the purpose for which the wire is required, the quantity, name of supplier and steel authorisation or licence references. Extension to October 31st is granted for orders already in hand.

Interchange of Inventions

The Defence (Patents, Trade Marks, etc.) Regulations, 1941, have been amended to enable British subjects resident in the United Kingdom to enter into an agreement respecting the use of an invention, discovery or design in the United States without a permit from a "competent authority." Government Departments are also empowered to require the grant of licences in specified cases. Arrangements regarding compensation are dealt with by the Order. The amendment follows an agreement made between the British and American Governments for the exchange of patents during the war.

Cutting-Tool Mutual Aid

To ensure the even distribution of small cutting tools and to remove bottlenecks holding up production the organisation of mutual aid exchanges has now been extended all over the country. Full details of the scheme are set out in a booklet entitled "The Mutual Aid Scheme for Small Tools" issued by the Machine Tool Control of the Ministry of Supply, 35, Old Queen Street, London, S.W.1. The booklet is issued in two forms, one covering the complete regional organisation and the other dealing individually with each of the twelve regions. Maps are included showing the mutual aid centres and the regional centres.

Payments to "Released" Employees

Reporting a decision to release a number of employees of the Electricity Department for national service, the Emergency Committee of the Stoke Newington Borough Council recommends that these men shall be granted leave of absence and promised reinstatement in the Council's service provided they make application two weeks from the date on which their services in the work to which they are directed is determined. It is also proposed that the period of their absence shall count for superannuation purposes if the appropriate contributions are paid by the employees.

Women's Wages

Last week the Transport and General Workers' Union and the General and Municipal Workers' Union put forward a claim for the adjustment of wages of women in the engineering industry. It was maintained that women doing the same work as men, particularly in the setting up and operation of machine tools, should receive men's rates. As regarded semi-skilled work, it was contended that the minimum wage should be 90 per cent. of the men's rate; for unskilled work the minimum should be 85 per cent. The employers have undertaken to reply to the unions within a month.

Wages in the Cable-Making Industry

The Joint Industrial Council for the Electrical Cable-Making Industry announces that the cost of living figure on September 1st (100 points above the 1914 level), will not involve any alteration in wages on the third pay-day in October.

Packaging Research

At a representative meeting held in London last week approval was given to a five-year programme of packaging research to be conducted by the Printing and Allied Trades Research Association. Leading packers and packing material makers are to co-operate and Government financial support has been conditionally promised. By concentrating work at a central laboratory separate research programmes will be co-ordinated for the purpose of assisting in the conservation of packaging materials.

Borough Polytechnic Jubilee

Many electrical engineers who commenced their electrical training at the Borough Polytechnic will learn with interest that this famous institute celebrated its jubilee on September 30th; it was opened on September 30th, 1892, by the Earl of Rosebery. A scheme was drawn up by the Charity Commissioners for the endowment and management of the Polytechnic and an annual sum of £2,500 was allotted by the London Parochial Charities for maintenance, which until quite recently was supplemented by a further £1,000 per annum, and by grants and loans towards building extensions.

The Polytechnic was one of three institutes established by the South London Polytechnic Council and began its work in the premises formerly occupied by the Borough Road Training College, classrooms and laboratories being adapted from rooms previously used as dormitories. It was an immediate success and 2,375 students and members were enrolled in the first session. Various classes were opened from time to time and many of them were started and developed as pioneer educational work in this country, such as heating and ventilating engineering, plastics, and nitro-cellulose finishes.

Runway Mishap

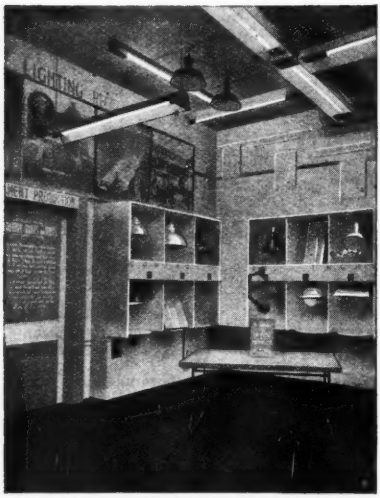
At Liverpool Police Court last week, the Liverpool Corporation was summoned for an alleged contravention of the Factories Act. The case was a sequel to a fatal accident at a power station. The Corporation brought a cross-summons against Frances Morton & Co., Ltd., of Gorston, alleging that as contractors they were the actual offenders.

It was stated that the accident was caused by a small trolley running off the end of an overhead runway and falling on to a man who died two days later. The defect alleged was that no stop had been placed at the end of the runway when a section was removed to Morton & Co.'s works to be bent. Another firm of contractors was using the runway at the time of the accident. The district inspector of factories held that as owners and occupiers of the power station, the Corporation was responsible for the safety of all plant and for the observance of the Factories Act. The defence of the Corporation was that all due diligence had been used to enforce the Act; the runway was not part of the ordinary working plant and was seldom used by any member of the Corporation staff, except a man who looked after the fans.

The magistrates dismissed the summons against the Corporation. They found Morton & Co. guilty and fined them £50. They suggested that half of this penalty should be applied for the benefit of the family of the man who had been killed. Morton & Co. were ordered to pay £15 2s. costs.

The Scottish Lighting Service Bureau

The activities of the E.L.M.A. Lighting Service Bureau of Scotland are modelled on similar lines to those of the London Bureau and, during the years before the war 800 lectures had been given to 45,000 people. Now, after three years of war and guided by the experience of the Electric Lamp Manufacturers' Association in other parts of the country, the demonstration rooms have been reconstructed to illustrate the various factory lighting regulations. In the comparatively small display space available, it is possible to show levels of illumination from fractions of a ft.-candle up to very nearly 100 ft.-candles including, of course, an installation giving the mandatory minimum for factory lighting of 6 ft.-candles. All forms of electric-discharge and tungsten filament lamps are available.



One of the reconstructed demonstration rooms of the Scottish Lighting Service Bureau

All possible space has been utilised and even the doors have been called into service for displaying graphs, diagrams as well as pictorial sketches of the more common faults in lighting practice. The new exhibition, in its central position at 29, St. Vincent Place, Glasgow, C.1, opened on September 30th, and should prove of great value to lighting engineers in Scotland. Those who have not yet had an opportunity of inspecting the 80-W, 5-ft. fluorescent lamp in service should take advantage of the display now available. Mr. M. W. Hime, the district engineer, will be glad to give any assistance required.

Australian Plant Contracts

Tenders (Melbourne) reports that the Sydney County Council Electricity Department has placed the following contracts :—Two 30,000-kVA power transformers for Bunnerong power station (£23,663).—A.S.E.A. (Aust.) Pty. Ltd. Three 10,000-kVA auto transformers for Five Dock substation (£8,678) and three 8,000-kVA power transformers for Hunter's Hill substation (£19,900 plus sales tax).—Electrical Plant Manufacturers Pty., Ltd.

Fatalities

A verdict of " Accidental death " was recorded at a recent inquest at Sheffield on Enoch Davernport (55), motorman, who was found dying in an electric furnace switch-room at the works of Kayser Ellison & Co., Ltd. It was stated that he went into the switch-house apparently to clean the instruments. A little later there was a report, and he was found lying on the floor with his clothing ablaze. Mr. F. Bowles, electrician, said that Davernport told him after the accident, that he forgot the switch.

Responsibility for delay in repairing dangerous defective electrical equipment in an air-raid shelter at Tardy Gate was raised at an inquest at Preston on September 24th, on Aircraftman Alfred Kennedy, aged twenty, of Ashton-under-Lyne, who received a fatal electric shock in the shelter. A verdict of " Death by misadventure " was returned. The coroner said that something would have to be done to fix responsibility for keeping the equipment in order.

TRADE MARK APPLICATIONS

RECENT applications for British trade marks include the following, objections to either of which may be entered within a month of September 23rd:—

P D (design). No. B614,560. Class 6. Electrolytic copper.—Phelps Dodge Corporation, 40, Wall Street, New York. To be associated with No. 385,120 (2194) v. Address for service is, c/o Stevens, Langner, Parry & Rollinson, 5 to 9, Quality Court, Chancery Lane, London, W.C.2.

EKCO. No. B617,851. Class 11. Electric lamps.—E. K. Cole, Ltd., Priory Crescent, Southend-on-Sea. (By consent.)

Supply in Sydney

Increasing Demands on Council's Services

THE report of the Sydney (N.S.W.) County Council has always been a full and informative document, and now that such statistics as it contains are not available regarding undertakings in this country, it has an added interest. We were, therefore, especially pleased to receive last week from Mr. R. Vine-Hall, the general manager, a copy of his report for 1941.

The Council, an *ad hoc* body composed of five members, is solely concerned with electricity, which it supplies direct or in bulk in an area of 897 sq. miles with a population of over a million. Last year many demands arising out of war conditions were made on the Council's organisation, but all its services were maintained, and Mr. Vine-Hall pays a tribute to the " keenness to serve " of the employees, due to which, he says, some remarkable successes were achieved.

A total of 888 million kWh was generated at the Council's power stations, an increase of 83·6 million kWh compared with 1940. In the preceding eight years the largest annual increase was 64 million kWh in 1937, so that last year's addition was by far the most considerable in that period. The maximum kWh generated in 24 hours was 3,328,700 on June 28th, compared with 2,990,900 on July 5th, 1940. The system maximum load was 217,800 kW (180,800 kW).

Station Performance

At Bunnerong " A " station 482 million kWh was generated with an average coal consumption per kWh of 1·428 lb. (603·5 million kWh and 1·393 lb. in 1940). Other performance data are : Steam consumption per kWh generated 10·82 lb. (10·75 lb.) ; average gross BThU per lb. of coal as fired, 11,540 (11,720) ; and thermal efficiency on kWh sent out, based on gross calorific value of coal as fired, 19·91 per cent. (20·09).

Performance figures of Bunnerong " B " station, where a second 50,000-kW unit, together with two 350,000 lb. per hr. boilers, was put into service during the year, are as follows : kWh generated, 405·7 million (200·6 million) ; lb. of coal per kWh, 1·079 (1·108) ; lb. of steam per kWh, 9·13 (9·26) ; BThU per lb. 11,830 (11,780) ; and thermal efficiency, 25·29 (24·66).

Coal consumed in 1941 amounted to 502,818 tons, the cost being £567,884. The average cost (including unloading, etc.) was £1 2s. 7d. per ton, equivalent to 0·179d. per kWh sold, compared with 475,932 tons, costing £514,285, at an average cost of £1 1s. 7d. per ton and 0·177d. per kWh sold for 1940.

During the year a contract was entered into with C. A. Parsons & Co., Ltd., for the supply of an additional 50,000-kW turbo-alternator unit to be installed during 1943. This unit will be supplied with steam from the existing boilers. Owing, however, to the prevailing conditions, the British Government, at the date of the report, had not given permission for its manufacture. Design and drafting work was carried out in connection with the project and tenders were invited for some of the associated plant required in connection with the installation of the unit.

The Council approved of the construction of a new power station on the Pyrmont site which will have an installed capacity of 200,000 kW, the first unit being required for service by 1946. A new switch-house, to permit of the re-arrangement of the 33,000-V feeders supplying the city and northern suburbs is to be completed, as part of this project, by 1944.

High-Pressure Steam Plant

Preliminary design and engineering work was carried out in connection with the scheme. Draft specifications for one 50,000-kW turbo-alternator unit and one boiler of approximately 450,000 lb. per hour continuous maximum rating, were prepared. The steam turbine plant will operate at a pressure of 1,200 lb. per sq. in. at a temperature of 925 deg. F. A specification was issued and tenders received for 33,000-V switchgear required for two turbo-alternator units and two feeder groups.

A scheme has been developed whereby the new power station will have a direct mechanical transportation system connecting with wharfage at Blackwattle Bay for the handling of coal to the plant and the disposal of boiler refuse. Arrangements were advanced for the purchase of the various properties necessary for the development of this scheme.

Sales of electricity increased by 9 per cent. to 760·4 million kWh, of which 221·3 million kWh was supplied for domestic purposes. The Electricity Sales Branch continued to achieve good results, and the apparatus sold or hired through the efforts of the advisory service represented an aggregate additional load of 43,120 kW. At the end of the year the total number of consumers was 271,608, an increase of 8,081 during the period.

The total revenue of the Council was £3,701,221 and expenditure £3,550,147, leaving a net profit of £151,074. The average cost per kWh sold was reduced from 1·195d. to 1·121d. An analysis of this figure shows that generation cost 0·255d. (0·257d.) ; distribution, 0·127d. (0·143d.) ; and fixed charges, 0·563d. (0·611d.). The average price per kWh was reduced from 1·185d. to 1·155d. the average for domestic supplies being 1·457d.

During the year twelve months' leave of absence was granted to the assistant general manager, Mr. D. J. Nolan, to permit his services to be made available to the Ministry of Munitions, and fourteen other officers were relieved to engage in war work. At the end of the year 354 employees were absent on active service.

Power Factor Tests

The article by Mr. G. W. Stubbings bearing the above title which appeared in our issue of September 4th, is incorrect in regard to fig. 2. In this the connections to the top two left-hand terminals of the meter should be transposed.

Paper Salvage Drive

Industry Asked for 5,000 Tons

AN intensive campaign to collect from the electrical industry at least 5,000 tons of waste paper by the end of the year has been commenced by a Committee representing all branches of the industry and a special appeal is being addressed to many hundreds of individual undertakings.

The Electrical Industry Waste Paper Recovery Committee comprises Mr. V. W. Dale (B.E.D.A.), chairman, the Hon. J. R. Rea (B.E.A.M.A.), Mr. L. C. Penwill (E.C.A.), Sir Thomas Purves (C.M.A.), Mr. W. J. Jones (E.L.M.A.), Mr. A. Albrecht (E.W.F.), Mr. W. Finlay (E.C.A. of Scotland) and Mr. H. S. Pocock (Technical and Trade Press).

Pointers to the directions in which waste paper is to be found are given in the appeal. For instance, it is suggested that desks, counters, filing cabinets, shelves, cupboards and store-rooms should be thoroughly turned out for the recovery and disposal of all old books, catalogues and other commercial papers which are no longer required.

Reply-paid postcards accompany the appeal so that with little trouble firms can notify the Committee when their first consignments are ready for collection. The card also enables the sender to indicate whether the proceeds of the sale of the paper can be sent to the Electrical Industries Benevolent Association—a course which is strongly recommended and which enables two valuable services to be rendered at one and the same time.

Institution Notes

THE British Section of the SOCIÉTÉ DES INGENIEURS CIVILS DE FRANCE is holding its 85th ordinary general meeting (to which members of the Society of Swedish Engineers in Great Britain are invited) at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, W.C.2., at 5 p.m. on Tuesday, October 6th. Mr. W. J. E. Binnie, M.Inst.C.E., is to preside and a paper on "Distribution of Electricity in London," will be read by Mr. E. H. Jesty, A.M.I.E.E.

* * *

In the note on the modification in the grading of members of the INSTITUTE OF INDUSTRIAL ADMINISTRATION last week (page 400) it was incorrectly stated that the original corporate members were called fellows and members. They were actually named fellows and associates, and the classes of member and associate member are new. Present associates will now become associate members, and the old class of non-corporate members called affiliate members will become associates.

* * *

Mining Engineers' Meetings

Delivering his presidential address at Newcastle-on-Tyne before the North of England branch of the ASSOCIATION OF MINING ELECTRICAL AND MECHANICAL ENGINEERS, Mr. A. H. Kellett suggested that the training of colliery mechanics should be on a much wider basis than at present. He said that one of the mining industry's main problems after the war would be the recruitment of adequate numbers of the right type of boy to the industry, and this could be done by making the training and the work sufficiently attractive.

The opening meeting of the West of Scotland branch of the Association for the 1942–43 session was held recently at the Institution of Engineers and Shipbuilders in Scotland, when Mr. Herbert E. Murray, the new president, delivered his address. At the next meeting, to be held at the Royal Technical College, Glasgow, on Saturday, October 10th, Mr. John McCallum will read a paper entitled "A Review of Some Problems for the Colliery Mechanical Engineer."

Forthcoming Events

Institution of Electrical Engineers.—*Wireless Section.*—October 7th, 5.30 p.m. Dr. R. L. Smith-Rose's inaugural address.

Transmission Section.—Wednesday, October 14th, 5.30 p.m. Inaugural address of Mr. P. E. Rycroft.

Installations Section.—Thursday, October 15th, 5.30 p.m. Mr. R. Grierson's inaugural address.

Measurements Section.—Friday, October 23rd, 5.30 p.m. Address by the chairman, Mr. E. H. Miller.

North-Western Centre.—Saturday, October 3rd, Manchester. Chairman's address by Mr. L. H. A. Carr.

Western Centre.—Monday, October 12th, Bristol. Chairman's address by Mr. C. Culmer Hodges.

North-Eastern Centre.—Monday, October 12th, 6.15 p.m. Neville Hall, Westgate Road, Newcastle-on-Tyne. Chairman's address by Mr. H. W. Green.

Electrodepositors Technical Society.—*Birmingham.*—Tuesday, October 6th, 6 p.m. "Recent Developments in Metal Rectifiers as applied to Electrodeposition," by Mr. D. Ashby, B.Sc.

Institution of Mechanical Engineers.—Friday, October 9th, 5.30 p.m. Storey's Gate, S.W.1. Informal meeting on "The Training Activities of the Ministry of Labour," to be introduced by Mr. E. Watson Smyth.

Correspondence

Industrial Radiography

IN the *Electrical Review* of September 25th there was an interesting article entitled "Industrial Radiography." In the second paragraph there appears an entirely incorrect statement, *viz.*, "If, however, a sufficiently powerful source is used (tubes have been designed to operate at 1,000 kV) it is possible to use a fluorescent screen for observation."

This implies that it is impossible to use a fluorescent screen except with very high voltages, perhaps in the region of 1,000 kV. This is not true. The degree of fluorescence obtained depends upon the milliamperes passing through the tube which is quite independent of the tube voltage. I frequently use a fluorescent screen with complete success at voltages as low as 60 kV.

Ashford, Middlesex. S. A. STRODE, A.M.I.E.E.

ELECTRICITY SUPPLY

Joint Meter Reading. Grit Abatement at Southampton.

Chester.—LOANS SANCTIONED.—The Corporation Electricity Committee has obtained sanction to loans for the main switching station, etc. The Committee is to provide larger transformers at substations at a cost of £875.

Croydon.—FACTORY SUPPLIES.—The Corporation Electricity Committee is to provide increased supplies to factories at a cost of £1,366.

Guildford.—HOSPITAL SUPPLY.—The Electricity Committee is to provide an increased supply to the Warren Road Hospital at a cost of £1,450.

Hastings.—SUPPLY TO FARM.—The Electricity Committee is to provide a supply to La Rette Farm, Battle, at a cost of £80.

Hawarden.—UNDERTAKING'S FINANCES.—The Rural District Council has decided to meet the deficit on the electricity undertaking by a rate levy. It was reported at a Council meeting that the Electricity Commissioners had agreed to increased tariffs.

London.—METER READING EXPERIMENT.—Last week an experimental system of joint meter readings and collections was put into operation by the Hackney Borough Council and the Gas Light & Coke Co. Reporting on the matter the Council's Civil Defence and Finance Committee states that the Corporation Electricity Department will be responsible for electricity and gas meter readings and collections on the Pembury estate and the Gas, Light & Coke Co. for those on the Kingsmead estate. If the experiment proves successful consideration will be given to an extension of these arrangements.

HAMMERSMITH.—Three e.h.v. feeders are to be replaced at a cost of £22,516.

ISLINGTON.—The Electricity Committee has obtained sanction to loans for mains and plant.

LEWISHAM.—The Borough Council Emergency Committee is to provide electric heating at the North Depot at a cost of £430.

Oswaldtwistle.—STREET LIGHTING.—"Star lighting" is to be introduced this winter.

Southampton.—GRIT NUISANCE.—In reply to an inquiry at a Town Council meeting as to the progress of steps taken to abate the nuisance caused by grit emission from the power station chimneys, the Mayor said that there was the prospect of "a very slight improvement" as the result of certain measures taken by the Electricity Department. It may be recalled that in the summer a deputation from the Council to the Mines Department urged that the quality of coal should be improved and better arrangements made regarding the segregation of the various classes, and it was subsequently reported that as the result of instructions from the Mines Department to the shippers' inland manager it was hoped that there would be an improvement in this respect (*Electrical Review*, July 10th). However, at a recent meeting of the Electricity Committee a resolution was passed that the attention of the Emergency Committee should be again directed to the grit nuisance with a view to further representations being made to the Ministry of Fuel and Power and the local Members of Parliament.

Southend-on-Sea. — FIXED CHARGES AND ECONOMY.—Councillor Dyer asked the chairman of the Electricity Committee at a Town Council meeting whether any steps had been taken with regard to an alteration of the fixed charge of the "all-in" domestic rate, which must tend to operate against economy. Could Southend give a lead in this direction? Alderman Johnson promised that the matter should be considered by the Electricity Committee at its next meeting. He pointed out that the minimum charge on several domestic tariffs had already been discontinued.

Tynemouth.—ANNUAL REPORT.—Councillor T. Duff, chairman of the Electricity Committee presented the Department's report for the year ended March 31st last at a meeting of the Council on September 23rd. He said that although the surplus of revenue over expenditure had fallen from £6,300 to £1,500, owing to increased coal costs and higher taxation, the undertaking was in a very healthy condition. Councillor Duff paid a special tribute to the engineer, Mr. J. B. Glen.

The Committee proposes to close the showroom at the corner of Saville Street and Howard Street, but provision has been made to deal with questions raised by consumers.

DIVERSION OF CABLES.—The Electricity Committee has arranged terms for the diversion of cables at a cost of £1,000.

Overseas

Canada.—MOUNTING DEMAND.—A primary load increase of 17·1 per cent. during July as compared with the corresponding month last year is reported by the Ontario Hydro-Electric Power Commission. The Commission's engineers predict that by the end of the year the primary demand of the Niagara, Georgian Bay and Eastern Ontario systems will be in the neighbourhood of 2,197,000 HP and as the capacity at that time will be 1,945,000 HP, a power shortage of approximately 250,000 HP is anticipated.

Eire.—DUBLIN RESTRICTIONS RELAXED.—Following upon the easing of restrictions upon the commercial and domestic consump- of electricity in Dublin street lighting has been restored in the city and suburbs. In the central area there is again all-night lighting, but in the outer districts it is still restricted to half the normal and is switched off at midnight.

N.W. England Scheme Adopted

The Central Electricity Board has adopted without modification the North-West England and North Wales Electricity (Alteration and Extension) Scheme, 1942, details of which were published in our September 4th issue.

Codes of Practice

Functions of New Committees

THE Minister of Works and Planning has now completed his arrangements for the Codes of Practice Committee, established to co-ordinate technical practice in the different branches of civil engineering, public works and building. The Committee will deal with post-war as well as wartime activities and its object will be to direct the preparation of codes setting out how all materials can best be applied to the task in hand. These will aim at increased efficiency in constructional and other work, and at economy in labour and material. The Committee will have no power to lay down obligatory requirements of any kind.

There are a number of separate codes for the many professions and trades engaged in building and constructional engineering, but one code has paid too little regard to another. While the first concern of the Committee must be to satisfy the immediate need for certain individual codes, its sponsors see as its ultimate object the creation of a comprehensive code for civil engineering and building.

Just before the war a scheme was launched by the British Standards Institution to bring together the technical institutions in a Professional Codes of Practice Committee, but the individual bodies still reserved their full right to prepare and issue codes at their own discretion. In creating the Codes of Practice Committee, the Minister of Works has completed the work which was thus begun.

The full name of the Committee, established in collaboration with the Ministry of Health after prolonged discussions with the various interests, is the Committee for Codes of Practice in Civil Engineering, Public Works and Building. The Committee is composed of representatives of the principal technical institu tions, the building research departments of Government, the British Standards Institution and the Building Industries National Council. These having reached complete agreement on the principles involved have nominated permanent representatives.

Representation

The bodies concerned are the Royal Institution of British Architects, the Institution of Civil Engineering, the Institution of Electrical Engineers (representatives, Messrs. J. R. Beard and P. V. Hunter, C.B.E.), the Institution of Mechanical Engineers (representatives, Col. S. J. Thompson, D.S.O. and Dr. H. L. Guy, F.R.S.), the Institution of Municipal and County Engineers, the Institution of Structural Engineers, the Incorporated Association of Architects and Surveyors, the Building Industries National Council and the British Standards Institution (representatives, Messrs. C. le Maistre, C.B.E., and P. Good, C.B.E.). In addition, the Ministry of Health, the Ministry of Home Security, the Ministry of Works and Planning and the Building Research Station will have assessor members.

The terms of reference of the Committee are : To direct the preparation of codes of practice for civil engineering, public works, building and constructional work. The Committee will not itself prepare the codes : each will be the business of a special sub-committee. The Committee will authorise the appointment of these sub-committees ; it will also lay down the responsibilities of the various technical institutions for their formation, for the appointment of members and for the drafting of terms of reference. It will ensure that every relevant interest is duly considered by the sub-committee, including user and consumer interests as well as those of the industrial manager and craftsman. Each code will be published in draft form and fully commented upon before the Committee gives its final approval.

Sir Clement Hindley has been appointed by the Minister to be chairman of the Committee. He has the assistance of Mr. C. Roland Woods who has resigned his membership of the Committee to which he had been nominated by the Building Industries National Council. Pending the appointment of a technical assistant by arrangement with the Building Research Organisation of the Department of Scientific and Industrial Research, he will also have the assistance of Mr. R. Fitzmaurice. Mr. Percy Good, director of the British Standards Institution, and Mr. Francis Lorne, one of the assistant directors in the Directorate of Post-War Building, will also assist the chairman in his work. The offices of the Committee are at Lambeth Bridge House.

Building Standards Committee

With Mr. Sydney Tatchell, F.R.I.B.A., as chairman, a Standards Committee has been set up by the Ministry of Works and Planning. It comprises representatives of local authorities, housing societies, the building industry, architects and some of the leading engineering institutions.

The British Standards Institution is represented by Mr. P. Good, M.I.E.E., and the Institution of Electrical Engineers by Mr. E. A. Reynolds, M.A.

The objects of the Committee are :—" To study the application in building of standard plan elements, standard specifications and building components, and methods of pre-fabrication, with the particular object of ensuring (*a*) economy in the use of material in the post-war period, (*b*) simplified and speedier procedure and construction, and (*c*) wherever possible, improved design. To make recommendations for such standards as well as for standards for terminology and consumer requirements ; to collect, review and correlate recommended standards put forward by other Study Committees of the Directorate (of Post-War Building) ; and to draft material for the British Standards Institution and the Codes of Practice Committee of the Ministry of Works and Planning, to be used in the promulgation of official British Standards and Codes."

The work of the Committee is viewed as falling into four categories :—Practice (with special reference to the Codes of Practice Committee) ; designs ; materials ; and pre-fabrication.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The London Passenger Transport Board has given notice of its intention to redeem at par on January 1st, 1943, the outstanding 4½ per cent. Trade Facilities Act stock (£12,583,000). Stockholders are offered the alternative to cash of taking up a new 3 per cent. stock (1967–1972) which will be guaranteed by the Government as to principal and interest.

Any stock not taken up in exchange will be sold at 97½ per cent. free of commission. The offer of conversion is to remain open until November 18th. A cash payment of £2 10s. per £100 of old stock surrendered to meet the difference between the redemption price and the issue price of the new stock is to be made.

Pye, Ltd., reports a trading profit for the year to March 31st of £109,116, a reduction of £1,938 as compared with the preceding year. After deducting directors' fees, depreciation, taxation, etc., there is a net profit of £34,852 (against £48,665). The employees' active service fund receives £2,000, the participating dividend on the preferred ordinary stock is 2 per cent., again making 10 per cent. for the year, and the dividend for the year on the deferred stock is maintained at 25 per cent. The balance carried forward is £99,569 (against £98,641 brought in).

Bennis Combustion, Ltd., reports a profit for the year to April 30th of £29,034, as compared with £28,883 for the previous year, and after providing for income tax, E.P.T., staff fund, etc., there is a net balance of £17,709 (against £14,833). The ordinary dividend for the year is maintained at 10 per cent., general reserve receives £4,000 and the balance carried forward is £3,758 (against £3,549 brought in).

Associated Fire Alarms, Ltd., announce a profit of £1,126 for 1941–42 (against £2,330). The dividend is maintained at 6 per cent. The report refers to the losses sustained by the company through enemy action and says that few of the installations can be replaced before the end of the war.

Altrincham Electric Supply, Ltd., has announced an interim dividend on the cumulative participating ordinary shares of 10 per cent. and on the deferred shares of 18·772 per cent., both the same as last year.

The Shropshire, Worcestershire & Staffordshire Electric Power Co., has declared interim dividends of 4 per cent. on the "A" ordinary and 2½ per cent. on the "B" ordinary shares, as last year.

The South Wales Electric Power Co., is maintaining its interim dividend at 2 per cent.

The Urban Electric Supply Co., Ltd., is repeating its interim dividend of 4 per cent.

The Woking Electric Supply Co., Ltd., has declared an interim dividend of 3 per cent., tax free (unchanged).

The Salisbury Electric Light & Supply Co., Ltd., is paying an interim dividend of 4 per cent., as last year.

The Cornwall Power Co., announces the payment of 3½ per cent. on its 7 per cent. preference shares.

The Colombo Electric Tramways & Lighting Co., Ltd., reports that its Ceylon profit for 1941 was £17,533 (against £13,646). Of this £2,000 is set aside for contingencies and £6,500 is put to reserve. A dividend of 6 per cent. is paid, leaving £38,935 (against £39,101) to be carried forward.

The Oriental Telephone & Electric Co., Ltd., is paying an interim dividend of 3½ per cent. on the 7 per cent. cumulative preference shares for 1942. No announcement of an interim ordinary dividend is made; last year 5 per cent. was paid.

The Nigerian Electricity Supply Corporation, Ltd., is maintaining its dividend at 4 per cent. (less tax at 5s. 6d.), again making 8 per cent. for the year.

The East African Power & Lighting Co, Ltd., has announced a final dividend of 4 per cent., making 7 per cent. for the year (same).

Richard Johnson, Clapham & Morris, Ltd., from a trading profit of £31,090 for 1941-42, are paying a final ordinary dividend of 11¼ per cent., again making 15 per cent. for the year.

The Cables Investment Trust, Ltd., has declared a final dividend of 3 per cent. maintaining the year's distribution at 5 per cent.

The Dubilier Condenser Co. (1925), Ltd., is again paying a dividend of 10 per cent. for the past year.

Ericsson Telephones, Ltd., is maintaining its interim ordinary dividend at 5 per cent., free of tax.

Waite & Son, Ltd., are paying a first and final dividend of 3 per cent. (against 2 per cent.).

New Companies

Walker Miller & Co., Ltd.—Private company. Registered September 8th. Capital, £1,200. Objects: To carry on the business of electrical engineers and contractors, etc. Directors: F. J. E. Walker, 119, Ringington Road, Sheffield, and J. W. Miller, 32, Cawthorne Grove, Sheffield. Registered office: 144, Charles Street, Sheffield.

Valcoma, Ltd.—Private company. Registered September 7th. Capital, £2,000. Objects: To carry on the business of manufacturers of valve components, electrical and mechanical engineers, manufacturers of radio appliances and equipment, tool makers, etc. Subscribers: H. F. Gough, and F. A. G. Schoenberg, both of 141, Fenchurch Street, E.C.3. Solicitors: Blewitt & Son, 141, Fenchurch Street, E.C.3.

Ridge Electrical Co., Ltd.—Private company. Registered September 10th. Capital, £1,000. Objects: To carry on the business of refrigera-

tion and electrical engineers, manufacturers of and dealers in dairy equipment, batteries, conductors, insulators, radio sets and components, and electrical supplies of all kinds, etc. Directors: L. E. Lavender, " Nilgiris," Underriver Road, Hildenborough, Kent, and G. F. Eldridge, 108, Hectorage Road, Tonbridge, Kent. Secretary: S. J. Morgan. Registered office: 169, High Street, Tonbridge.

Oxley Developments Co., Ltd.—Private company. Registered September 12th. Capital, £500. Objects : To carry on the business of manufacturers of, and dealers in, wireless sets and equipment, amplifying instruments, picture producing, reproducing, transmitting and receiving apparatus, etc. Directors: R. F. Oxley and D. F. Oxley, both of 28, Meeting House Lane, Ulverston, Lancs. Registered office: 39, St. James' Street, London, S.W.1.

Fred Braham & Co., Ltd.—Private company. Registered September 12th. Capital, £1,000. Objects : To acquire the business of an electrical engineer carried on by F. Braham at Grimsby, and to carry on the same and the business of manufacturers of, and dealers in, batteries, wireless sets and accessories, etc. Directors: F. Braham and E. M. Braham, both of 39, Yarborough Road, Grimsby. Registered office: 39, Yarborough Road, Grimsby.

W. H. Stone (Western), Ltd.—Private company. Registered September 17th. Capital, £2,000. Objects : To carry on the business of electrical, wireless, mechanical and general engineers' agents, merchants, wholesale distributors, manufacturers and repairers of, and dealers in, radio and telephone apparatus and electrical equipment, etc. W. H. Stone, Imblefields, St. Mellons, Mon., is the first director. Registered office : 12, Pembroke Terrace, Cardiff.

Insulande, Ltd.—Private company. Registered September 18th. Capital, £1,000. Objects : To carry on the business of manufacturers of, and dealers in, insulating materials, rubber, balata, gutta percha, tubes, mats and other goods made from rubber, vulcanite or ebonite composition, etc. The subscribers are K. A. Jones, chartered secretary, and Mrs. F. Maskell, both of 103, Cannon Street, E.C.4. Secretary : K. A. Jones. Solicitor : S. Pearlman, 4, Stone Buildings, W.C.2.

Companies' Returns

Statements of Capital

Electricity Distribution of North Wales & District, Ltd.—Capital, £400,000 in £1 shares. Return dated April 2nd (filed May 7th), 1942. All shares taken up. £411,087 10s. paid (£1 per share on 202,000 and 21s. 6d. per share on 194,500 shares). £3,500 considered as paid on 3,500 shares. Mortgages and charges : £42,690.

Melton Mowbray Electric Light Co., Ltd.—Capital, £60,000 in 12,000 shares of £5 each. Return dated May 13th. 9,600 shares taken up. £48,000 paid. Mortgages and charges : £19,100.

Anglo-American Telegraph Co., Ltd.—Capital £7,000,000 in £191,660 ordinary stock, £3,404,170 preferred ordinary stock and £3,404,170 deferred ordinary stock. Return dated June 4th. All stock taken up. £600,000 paid. £6,400,000 considered as paid. Mortgages and charges : Nil.

W. T. Glover & Co., Ltd.—Capital, £500,000 in 100,000 preference shares and 400,000 ordinary shares of £1. Return dated May 7th. 100,000 preference and 344,550 ordinary shares taken up. £117,000 paid. £327,550 considered as paid. Mortgages and charges : Nil.

Bulwark Electrical Co. (Liverpool), Ltd.—Capital, £5,000 in £1 shares. Return dated December 22nd, 1941 (filed July 6th, 1942). 4,502 shares taken up. £502 paid. £4,000 considered as paid. Mortgages and charges : Nil.

Redcliffe Radio & Engineering Co., Ltd.—Capital, £5,000 in £1 shares. Return dated December 22nd, 1941 (filed July 16th, 1942). 1,000 shares taken up. £1,000 paid. Mortgages and charges : Nil.

W. E. Chappell, Ltd.—Capital, £1,000 in £1 shares. Return dated July 17th. 813 shares taken up. £165 paid. £648 considered as paid. Mortgages and charges : Nil.

L. E. Wilson & Co., Ltd.—Capital, £2,000 in £1 shares. Return dated May 21st. 1,602 shares taken up. £1,602 paid. Mortgages and charges : Nil.

Mortgages and Charges

Star Electric Carbons, Ltd.—Two mortgages dated May 3, 1940, and June 2, 1939, charged on (a) " Homeleigh," Couchmere Avenue, Ilford, and (b) " Firleigh," 13, Hermon Hill, Wanstead; also charged on 76, Cumberland Gardens, Clayhall Avenue, Ilford, dated February 16th, 1938 (being property acquired by the company on June 8th, June 18th, and June 15th, 1942, respectively). Amounts owing : £420 3s. 9d., £575 8s. 11d. and £600. Registered pursuant to Section 81 of the Companies Act, 1929. Holders: Trustees of Colchester Permanent Building Society, Colchester, and others.

Roberts Radio Co., Ltd.—Assignment on September 10th, 1942, of proceeds of certain contracts, to secure all monies due or to become due from the company to Barclays Bank, Ltd.

Bankruptcies

F. E. Roberts and **J. Savill** (Commercial Light, Heat and Power Co.), electricians, lately carrying on business at 47, Poland Street, London, W.1.—Application for discharge to be heard on October 7th at Bankruptcy Buildings, Carey Street, London, W.C.2.

G. A. Weston, electrical contractor and engineer, 5-6, Roman Wall House, Crutched Friars, London, E.C.3.—Application for discharge to be heard on October 13th, at Bankruptcy Buildings, Carey Street, London, W.C.2.

Liquidations

John Baker & Son (Electrical), Ltd.—Meetings October 24th at 20, Grosvenor Place, London, S.W.1, to receive an account of the winding-up by the liquidator, Mr. B. G. Pocock.

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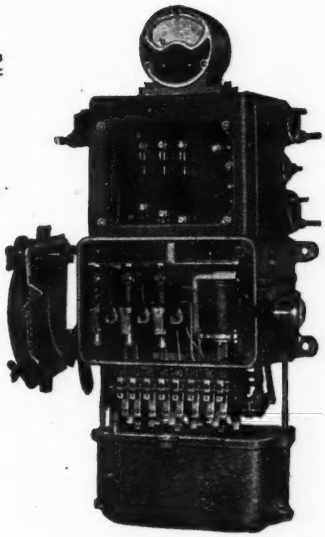

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STOCKS AND SHARES

TUESDAY EVENING.

THE weight of money still exercises a preponderant influence in Stock Exchange markets. For the time being, less attention is being paid to British Government and similar gilt-edged securities than to the ordinary shares of industrial undertakings Substantial sums of money will come into the markets within the next three or four months, and for these, some kind of employment will have to be found. No doubt the major part will go into National War Bonds and similar forms of war borrowing. But there will remain a margin for which the owners will require a higher rate of income than is obtainable from Government stocks. The knowledge of this is one of the factors which operate to keep industrial share prices so firm.

The Stock Exchange's financial half year has just concluded and, looking back over the past six months, it is surprising to note how considerable has been the appreciation in capital value of stocks and shares in commercial undertakings.

New Central Board Stock

The new Central Electricity Board (Civil Defence) 3 per cent. redeemable stock, which was privately placed at 97½, already shows its owners a profit of a point above the price which they paid for it. In spite of protests from the Consol market at the time the issue was placed outside the House, a tolerably free Stock Exchange market has developed, and at 98½ to 98¾ a fair amount of business takes place in it every day. The stock, like the other issues of the Central Board, is not eligible for purchase by most trustees. Seeing, however, that the security is as good as, if not better than, certain other stocks which come within the Trustee Act requirements, its attractions appeal to money that looks for a perfectly safe 3 per cent. income with a favourable prospect of a point or two appreciation in the price.

L.P.T.B. Conversion

London Passenger Transport will pay off £12½ million 4½ per cent. T.F.A. stock on January 1st next, at 100. The proprietors will be offered the opportunity of exchanging into London Passenger Transport 3 per cent. guaranteed stock, dated 1962-72. The practical effect will be to bring in fresh sums for investment in industrial shares.

Home Railways

The revived demand for Home Railway stocks to which attention was drawn here recently, has continued to make its influence felt to some extent, and in most cases prices keep the gains which they secured. The senior prior-charge issues are not affected by ordinary standards of earning. Their prices are controlled by considerations which control purely gilt-edged issues. But the junior stocks of the Home Railway companies still possess a certain amount of speculative attraction, and expectation toys with the idea of increased dividend payments being made next February upon London Passenger Transport "C" stock and upon certain other junior issues. The yields are substantial, as is generally recognised. In view of the considerable weight of money that forces up prices of stocks and shares in practically every market, the supporters of Home Railway stocks claim that there is justification, as well as scope, for the impression that prices will go higher. Southern preferred stock at 69 is 10s. up : Transport "C" shows no change at 48.

Cable & Wireless

Cable & Wireless ordinary stock has been up to 67, on a fair demand for speculative investment purposes from those who have been studying the position of the stock. It is assumed that the present dividend of 4 per cent. would seem assured for some years to come, by reason of the cushion created by the heavy liabilitity for E.P.T. during the past two years. This is pointed out by a firm of Stock Exchange brokers, who have been bringing to the notice of their clients the attraction of stock in which they consider that there is scope for still further gradual appreciation.

Advertisements published last week by Cable & Wireless showed what an astonishing volume of traffic is handled. With the bulk of messages going now by wireless, the expense of cable renewals and maintenance should be reduced in the coming years. These items alone last year cost over £1,000,000. The combine has suffered, of course, by the loss of some of its business to the East, owing to enemy action. The shortage of staff is another handicap. But at 65½, the ordinary gives a yield of 6⅛ per cent. on the basis of the 4 per cent. dividend now being paid.

Price Fluctuations

Nearly all the interim dividends that are now being declared on ordinary shares are similar to those of twelve months ago. The result is to confirm shareholders in the confidence which they feel in their investments and to fortify the prices of the shares concerned. Little doubt prevails as to the ability of the electricity supply companies to maintain their dividends for the full year. A few nominal price declines have taken place in order to bring quotations into closer relationship with dealing conditions. City of London, County, Isle of Thanet and British Power are all better.

(*Continued on page* 443)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939-40	Dividend 1940-41	Middle Price Sept. 29	Rise or Fall	Yield £ s. d.
Home Electricity Companies					
Bournemouth and Poole	12½	12½	50/-	..	5 0 0
British Power and Light	6	6	26/6	+6d.	4 10 7
City of London	7	7	26/6	+3d.	5 5 8
Clyde Valley	8	8	40/-	..	4 0 0
County of London	8	8	36/-	+1/-	4 9 0
Edmundson's:					
7% Pref.	7	7	33/6	−3d.	4 3 7
Ord.	6	6	28/-	..	4 5 9
Elec. Dis. Yorkshire	9	9	42/-	..	4 5 9
Elec. Fin. and Securities	12½	12½	48/6	−3d.	5 3 1
Elec. Supply Corporation	10	10	44/6	−2/-	4 10 0
Isle of Thanet	2	Nil	12/-	+1/-	—
Lancs. Light and Power	7½	7½	33/-	..	4 11 0
Llanelly Elec.	5½	5½	22/6	..	4 17 9
Lond. Assoc. Electric	4½	4	18/6	..	4 6 6
London Electric	6	6	23/6	−3d.	—
London Power Red. Deb.	5	5	104½	..	4 15 7
Metropolitan E.S.	8	8	35/6	..	4 10 2
Midland Counties	8	8	38/-	..	4 4 3
Mid. Elec. Power	9	9	41/6	..	4 6 9
Newcastle Elec.	7	7	30/-	..	4 13 5
North Eastern Elec. Ordinary	7	7	30/6	..	4 11 10
7% Pref.	7	7	33/6	..	4 3 7
Northampton	10	10	46/-	..	4 7 0
Notting Hill 6% Pref. (£10)	6	6	9	..	—
Northmet Power:					
Ordinary	7	7	32/6	..	4 6 2
6% Pref.	6	6	30/6	..	3 18 8
Richmond Elec.	6	6	23/9	..	—
Scottish Power	8	8	38/-	−3d.	4 4 3
Southern Areas	5	5	21/-	..	4 15 3
South London	7	7	24/6	−6d.	—
West Devon	5	5	22/6	..	4 9 0
West Glos.	4½	3½	19/6	−6d.	3 11 9
Yorkshire Elec.	8	8	39/6	..	4 1 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	4/3	..	—
Calcutta Elec.	7*	7*	26/-	..	5 7 9
Cawnpore Elec.	10	10	25/-	..	8 0 0
East African Power	7	7	27/6	+6d.	5 1 8
Jerusalem Elec.	7	5	17/6	..	5 14 4
Kalgoorlie (10/-)	7½	5	6/6	−1/-	7 13 10
Madras Elec.	6*	4*	17/6	−¼	4 11 4
Montreal Power	1½	1½	24½	+½	6 2 5
Palestine Elec. "A"	Nil	4*	22/6	+1/-	3 11 3
Perak Hydro-elec.	6	7	6/6	+6d.	—
Shawinigan Power	85cts.	90cts.	15½	..	—
Tokyo Elec. 6%	6	6	14½	..	—
Victoria Falls Power	15	15	76/5	+¼	3 18 9
Whitehall Inv. Pref.	5	5	16/-	+3d.	6 5 0

Company	Dividend 1939-40	Dividend 1940-41	Middle Price Sept. 29	Rise or Fall	Yield £ s. d.
Public Boards					
Central Electricity:					
1950-70	5	5	109	..	4 11 9
1955-75	5	5	114	..	4 7 9
1951-73	4½	4½	107½	..	4 3 9
1963-93	3½	3½	103½	..	3 7 8
1974-94	3¼	3¼	99¼	..	3 5 4
London Elec. Trans. Ltd.	2½	2½	96	..	2 12 1
London & Home Counties 1955-75	4½	4½	109	..	4 2 7
Lond. Pass. Trans.:					
A	4½	4½	115½	..	3 18 0
B	5	5	114½	..	4 7 4
C	3	2⅞	48	..	5 19 10
West Midlands J.E.A. 1948-68	5	5	108	..	4 12 7
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	110	..	5 9 1
Def.	1½	1½	26	..	5 15 5
Anglo-Portuguese	8	8	19/-	..	8 8 6
Cable & Wireless:					
5½ Pref.	5½	5½	105½	+1	5 4 3
Ord.	4	4	65½	−½	6 2 3
Canadian Marconi $1	Nil	4cts.	5/-	..	3 7 0
Globe Tel. & Tel.:					
Ord.	8½*	5*	28/-	..	3 11 5
Pref.	6	6	28/-	+6d.	4 5 9
Great Northern Tel.: (£10)	Nil	Nil	16	..	—
Inter. Tel. & Tel.	Nil	Nil	3	..	—
Marconi-Marine	7½	7½	29/6	+6d.	5 1 8
Oriental Tel. Ord.	16	10	52/6	..	3 16 2
Telephone Props.	6	Nil	12/-	..	—
Tele. Rentals (5/-)	10	10	9/9	..	5 2 7
Traction and Transport					
Anglo Arg. Trans.:					
First Pref. (£5)	Nil	Nil	3/-	..	—
4% Inc.	Nil	Nil	8½	−1	—
Brit. Elec. Traction:					
Def. Ord.	45	45	935	−15	4 16 3
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8	10	46/3	..	4 6 6
Brazil Traction	$1	50c	16½	−¼	—
Calcutta Trams	8	5½	18/3	..	6 0 9
Cape Elec. Trams	5	5	21/-	..	4 15 3
Lancs Transport	10	10	43/9	..	4 11 4
Mexican Light:					
1st Bonds	5	5	87½	−2½	5 14 1
Rio 5% Bonds	5	5	101	..	4 19 0
Southern Rly.:					
5% Prefd.	5	5	69	+½	7 5 1
5% Pref.	5	5	105½	..	4 14 9
T. Tilling	10	10	48/-	+6d.	4 3 4
Tilling & B.A.	7*	6½*	57/6xd.	..	2 5 3
West Riding	10	10	39/-	−6d.	5 2 7

(Continued on next page)

* Dividends are paid free of Income Tax.

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Sept. 29	Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing					
Aron Elec. Ord. ..	Nil	7½	27/–	..	5 11 1
Assoc. Elec. :					
Ord.	10	10	46/3	..	4 6 6
Pref.	8	8	39/–	..	4 2 0
Automatic Tel.& El.	12½	12½	52/6	..	4 15 3
Babcock & Wilcox	11	11	46/–	–6d.	4 15 8
British Aluminium	10	10	45/6	+6d.	4 8 0
British Insul. Ord.	20	20	95/–	..	4 4 3
British Thermostat (5/–)	18½	18½	16/3	..	5 13 10
British Vac. Cleaner (5/–)	12½	10	17/6	+6d.	—
Brush Ord. (5/–)..	Nil	6	6/6	..	4 12 4
Callender's ..	15	15	73/9	..	4 1 4
ChlorideElec.Storage	15	15	73/9	..	4 1 4
Cole, E. K. (5/–)..	Nil	7	14/–	..	2 10 0
Consolidated Signal	17	17	73/9	..	4 12 2
Crabtree (10/–) ..	17½	17½	33/–	..	5 6 1
Crompton Parkinson Ord. (5/–) ..	30	20	22/–	+9d.	4 11 0
E.M.I. (10/–) ..	Nil	6	17/3	–3d.	3 9 7
Electric Construction	10	10	34/6	..	5 16 0
Enfield Cable Ord.	12½	12½	52/6	..	4 15 3
Elecl. Switchgear (10/–)	10	10	20/–	..	5 0 0
English Electric ..	10	10	41/3	..	4 17 0
Ensign Lamps (5/–)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/–)	22*	20*	41/3	..	2 8 6
Ever Ready (5/–)	40	40	33/6	..	5 19 5
Falk Stadelmann	7½	7½	23/9	..	6 6 4
Ferranti Pref. ..	7	7	27/–	..	5 3 8
G.E.C. :					
Pref.	6½	6½	33/9	..	3 17 0
Ord.	20	17½	81/6	+6d.	4 5 6
Greenwood & Batley	15	15	33/–	+1/–	9 1 10
Hall Telephone(10/–)	10	12½	20/9	..	6 0 5
Henley's (5/–) ..	20	20	22/6	..	4 9 1
4½% Pref. ..	4½	4½	23/–	..	3 18 3
Hopkinsons ..	15	15	52/6	..	5 14 5
India Rubber Pref.	5½	5½	20/–	..	5 10 0
Intl. Combustion..	32½	30	110/–	..	5 9 0
Johnson & Phillips	15	15	62/6	+ 1/16	4 16 0
Lancashire Dynamo	20	20	71/3	..	5 12 4
Laurence, Scott(5/–)	15	12½	9/6	..	6 11 7
London Elec. Wire	7½	7½	28/3	..	5 6 2
Lucas, J.	15	15	68/9	..	4 7 3
Mather & Platt ..	10	10	42/6	+ 1/16	4 14 1
Met.Elec.Cable Pref.	5½	5½	21/3	..	5 3 6
Murex	20	20	97/6	..	4 2 0
Pye Deferred (5/–)	25	25	18/6	..	6 15 2
Revo (10/–) ..	20	17½	31/–	..	5 13 0
Reyrolle	12½	12½	61/3	+9d.	4 1 7
Siemens Ord. ..	7½	7½	26/3	..	5 14 3
Smith, S. (1/–) ..	50	37½	7/9	+3d.	4 18 6
Strand Elec. (5/–)	2	4	4/9	..	4 4 3
Switchgear & Cowans (5/–) ..	15	10	10/–	..	5 0 0
T.C.C. (10/–) ..	5	5	15/–	..	3 6 8
T.C. & M... ..	10	10	43/9	..	4 11 4
Telephone Mfg.(5/–)	9	9	10/–	..	4 10 0
Thorn Elec. (5/–)..	20	20	16/3	..	6 3 1
Tube Investments	23¾	20	87/6	+6d.	4 11 0
Vactric (5/–) ..	Nil	Nil	8/3	–3d.	—
Vickers (10/–) ..	10	10	17/6	+3d.	5 14 3
Ward & Goldstone (5/–)	20	20	20/–	..	5 0 0
Westinghouse Brake	10	10	50/–	..	4 0 0
Walsall Conduits(4/–)	55	55	38/9	..	5 13 4
West, Allen (5/–)	7½	7½	5/9	..	6 10 5

* Dividends are paid free of Income Tax.

Stocks & Shares (*Continued from page* 441)

In the foreign group, Madras Electric shares went back to 17s. 6d. and Kalgoorlie to 6s. 6d. Perak Hydro-Electrics are a little better at 6s. 6d., East African Power hardened to 27s. 6d. and Victoria Falls ordinary to 76s. 3d. Whitehall Electric preference at 16s. are up a few pence. The company, as previously announced, declared a dividend of 2½ per cent. on its 7½ per cent. preference shares, making 3¾ per cent. for the half year to March 31st last.

Equipment and Manufacturing

Price fluctuations in this group are mostly upward. Greenwood & Batley strengthened to 33s., attention being directed to the shares on account of the high yield they still afford at the present price. S. Smith deferred hardened to 7s. 9d. Johnson & Phillips at 63s. 6d. are 1/16 better. Reyrolle at 61s. 3d. have risen 9d. Amongst the heavy shares, Vickers strengthened to 17s. 6d. Babcocks went back to 46s.

Wireless and associated shares are a lively market, animation being sustained in A. C. Cossor, Electric and Musical, and others of kindred character. The hand of the speculator has perhaps played some part in contributing to market activity.

Brazilian Tractions

Canada having recently imposed an addition to E.P.T., questions arose in the Stock Exchange as to how far the extra tax would affect the earnings of companies such as the Canadian Pacific Railway, the Canadian utility companies and the Brazilian Traction undertaking. The last-named, although operating in Brazil, is registered in Montreal and at first it was thought that the full scale of Canadian E.P.T. would apply to its revenue by reason of its domicile. But a New York journal states that the company is not liable for Canadian income taxes. Proprietors of the shares are, nevertheless, subject to Canadian withholding tax on their dividends if they are resident outside Canada. On this reassurance, the price of Brazilian Electric Tractions which had been down to 16 recovered to 16½.

These shares are amongst the very few dollar issues in which there remains some pale reflection of pre-war popularity.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1940

5911. "Telecommunication exchange systems." Standard Telephones & Cables, Ltd. (Western Electric Co., Inc.). April 2nd, 1940. (547553.)

9311. "Polarisation of light." A. H. Stevens (International Polaroid Corporation). May 27th, 1940. (Convention date not granted.) (547554.)

16232. "Control apparatus for air and water craft." S. Smith & Sons (Motor Accessories), Ltd., and F. W. Meredith. November 8th, 1940. (547555.)

16802. "Arrangement for indicating a characteristic of an alternating-current electricity supply system." Standard Telephones & Cables, Ltd., E. M. S. McWhirter and C. H. Chambers. November 22nd, 1940. (547665.)

17023. "Electric couplings." F. G. Gillard, and Plessey Co., Ltd. November 28th, 1940. (547521.)

17036. "Control systems for electric motors." British Thomson-Houston Co., Ltd. March 28th, 1940. (547559.)

17078. "Telegraphic transmission apparatus." H. Paul-Huhne, J. E. Painton and E. W. Long. November 29th, 1940. (547628.)

17108. "Electro-magnetic switches for the remote control of electrical mechanisms." W. H. Norris. November 30th, 1940. (547560.)

1941

1214. "Synthetic resinous compositions." British Thomson-Houston Co., Ltd. February 1st, 1940. (547525.)

1284. "Electrical circuit arrangements for obtaining substantially constant relative phase shifts over a range of frequencies." Standard Telephones & Cables, Ltd., and K. G. Hodgson. January 31st, 1941. (547601.)

1306. "Permanent-magnet electric motors." S. I. Hitchcock. January 31st, 1941. (Cognate application, 15231/41.) (547668.)

1307. "Electrodes for sparking plugs." W. T. Griffiths. January 31st, 1941. (547602.)

2856. "Electrically driven vehicles with rheostatic and mechanical braking." General Electric Co., Ltd., and E. H. Croft. March 3rd, 1941. (547675.)

2933. "Antenna system for modulated-carrier signal receivers." Hazeltine Corporation. March 23rd, 1940. (547677.)

3121. "Operating mechanisms for electric circuit interrupters." Westinghouse Electric International Co. March 9th, 1940. (547681.)

3319. "Cathode-ray signal reproducing tube." Farnworth Television and Radio Corporation. October 9th, 1940. (547529.)

3419. "Modulation system for high-frequency oscillations." International Service Corporation. March 8th, 1940. (547605.)

4053. "Method of applying electric insulation." British Thomson-Houston Co., Ltd. March 26th, 1940. (547606.)

4097. "Machines for rectifying and polishing dies for wire-drawing." British Insulated Cables, Ltd., W. J. Clements and H. E. Jones. March 27th, 1941. (547572.)

4140. "Sound re-recording systems." Electrical Research Products, Inc. April 5th, 1940. (547574.)

4211. "Electrically driven vehicles." General Electric Co., Ltd., E. H. Croft and J. C. Turrall. March 28th, 1941. (547685.)

4518. "Vitreous coatings." Westinghouse Electric International Co. April 10th, 1940. (547532.)

4519. "Electrical measuring instruments." Westinghouse Electric International Co. April 10th, 1940. (547533.)

5009. "Air cleaners." Talboys Manufacturing Co., Ltd., and C. G. Smith. April 17th, 1941. (547607.)

5557. "Magnetos." American Bosch Corporation. May 15th, 1940. (547576.)

5558. "Magneto apparatus." American Bosch Corporation. May 15th, 1940. (547577.)

5669. "Induction heating apparatus." Budd Induction Heating, Inc. May 17th, 1940. (547579.)

5670. "Adaptors for work-receiving tables and the like." Budd Induction Heating, Inc. May 20th, 1940. (547608.)

5753. "Manufacture of ion-exchanging materials." J. Crosfield & Sons, Ltd., R. Furness and R. Wallington. May 2nd, 1941. (547690.)

5904. "Electric cables." British Insulated Cables, Ltd., and J. C. Quayle. May 7th, 1941. (547690.)

6296. "Dynamo-electric machines." Mawdsley's Ltd., and A. J. Parsons. May 15th, 1941. (547540.)

6376. "Electric fuses." W. T. Henley's Telegraph Works Co., Ltd. and H. C. Hoban. May 17th, 1941. (547610.)

6632. "Remote control systems using radio-frequency energy." Westinghouse Electric International Co. June 8th, 1940. (547638.)

6681. "Electric motor control systems." British Thomson-Houston Co., Ltd. May 25th, 1940. (547613.)

6932. "Telephone circuits." Standard Telephones & Cables, Ltd. June 5th, 1940. (547616.)

6939. "Incandescent electric lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. May 30th, 1941. (547542.)

7260. "Metallurgical furnaces." International Alloys, Ltd., W. E. Prytherch, E. Newell & Co., Ltd., and P. Howden. June 9th, 1941. (547584.)

7325. "Joints or terminating devices for electric cables." Pirelli-General Cable Works, Ltd., and H. Barron. June 10th, 1941. (547617.)

7455. "Wood-working machine." Union Cable Co., Ltd., and J. George. June 12th, 1941. (547694.)

7552. "Connecting or coupling devices for multi-core electric cables." G. R. Mason and Metropolitan-Vickers Electrical Co., Ltd. June 14th, 1941. (547618.)

8038. " Indicators or annunciators adapted to serve as relays." Telephone Manufacturing Co., Ltd., and A. C. Brockies. June 26th, 1941. (547587.)

8357. " Apparatus for heat-treating vulcanisable and other electric insulating materials." Okonite Co. December 31st, 1940. (547695.)

8406. " Thermionic valve voltage regulations." British Thomson-Houston Co., Ltd., J. Moir and W. J. R. Farmer. July 3rd, 1941. (547588.)

8579. " Resistance controllers for arc welding." Lincoln Electric Co., Ltd., and G. F. Clipsham. July 7th, 1941. (547547.)

8782. " Apparatus for connecting balanced and unbalanced networks in electrical systems." Standard Telephones & Cables, Ltd. July 20th, 1940. (547548.)

8966. " Wire coating dies." British Thomson-Houston Co., Ltd. July 17th, 1940. (547590.)

9134. " Device for testing the electrical insulation of electrically propelled road vehicles such as trolley-buses." English Electric Co., Ltd., P. L. Mardis and G. E. Waters. July 18th, 1941. (547591.)

9758. " Electric protective devices." British Thomson-Houston Co., Ltd. August 2nd, 1940. (547620.)

9870. " Electro cleaning baths." Vauxhall Motors, Ltd., and H. S. Bavister. August 2nd, 1941. (547592.)

10044. " Stabilising systems for synchronous dynamo-electric machines." British Thomson-Houston Co., Ltd. August 10th, 1940. (547622.)

10048. " Electron-discharge tube signal translating stage." Hazeltine Corporation. September 9th, 1940. (547623.)

12159. " Electric-discharge tubes." Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). September 19th, 1941. (547645.)

12160. " Gas-filled electric-discharge tubes." Philips Lamps, Ltd. (Naamlooze Vennootschap Philips' Gloeilampenfabrieken.) September 19th, 1941. (547646.)

14674. " Electric circuit control systems, particularly for illumination." Igranic Electric Co., Ltd. November 14th, 1940. (547649.)

14842. " Apparatus for cleaning the surface of anodes." C. E. Every (Hudson Bay Mining & Smelting Co., Ltd.) November 18th, 1941. (547651.)

15970. "Coupling for electric switch handles." Arrow Electric Switches, Ltd. (Arrow-Hart & Hegeman Electric Co.). December 11th, 1941. (Convention date not granted.) (547656.)

16810. " Device for drying chambers for the entry or discharge of material to be dried." Akt.-Ges. Brown, Boveri & Cie. December 30th, 1940. (547657.)

16851. " Electrical terminals." Crypto Equipment, Ltd., and E. T. Lawson-Helme. December 31st, 1941. (547658.)

1942

3627. " Lamp units." A. H. Stevens (Electronic Laboratories, Inc.) March 18th, 1942. (547661.)

Retailers' Mutual Assistance

IN view of the scattered raids now being made on this country, as a result of which any trader in any district may have his business destroyed or damaged, the Board of Trade has prepared a memorandum urging upon retailers the need for arranging mutual assistance schemes.

It is stressed that it is not possible to rebuild or repair damaged premises or to replace stocks if existing retail outlets are adequate to meet vital needs. Where shopkeepers cannot find alternative accommodation or share shops occupied by more fortunate neighbours preference must be given in the granting of licences under the Location of Retail Businesses Order to those shopkeepers who are selling the goods which the public needs most.

Mutual assistance schemes have proved their value in a number of towns and the Board says that it will do everything possible to assist organisers both before and after the event to make the schemes successful. It is suggested that only " essential " businesses should be included in a scheme; among those considered to fall within this description are those for retailing heating, cooking, lighting and wireless apparatus.

The Board makes it clear that the maximum of local initiative and adaptation is desirable, but it sets out for guidance the main points which a scheme should cover. Traders' committees, representing all classes of business, should be set up as soon as possible and liaison established with local authorities. In this the Area Distribution Officers of the Board will afford all possible help and advice. Committees should keep up to date lists of retailers of essential goods grouped by trade or class of goods sold, if possible with a rough indication of the volume of business done. Each member of a scheme should sign an undertaking to abide by the committee's decision and agree that if " unbombed " he will, when required, offer either temporary accommodation or some form of temporary partnership to another trader.

When schemes have been completed a notification should be sent to the Assistant Secretary, Industries and Manufactures Department I, Board of Trade, Millbank, London, S.W.1. Also committees should send a list of traders who agree to provide " hospitality " accommodation to the Local Price Regulation Committee in order to simplify licensing procedure under the Location of Retail Businesses Order. Liaison should also be maintained with the District Insurance Committee for the immediate notification of inaccessible salvage. Duplicate records should be kept in separate places and arrangements made for substitutes to be appointed for all officials of traders' committees in case of casualties.

A number of different authorities are concerned with the restoration of bombed areas and organisers of schemes should get into touch with, or know the addresses of, such authorities. The latter include the Emergency Works Officer of the Ministry of Works and Planning, Regional and Local Transport Officers, the Regional Controller of Factory and Storage Premises, the Assistance Board and the W.V.S.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Belfast.—October 7th. Electricity Department. Carbon-dioxide fire extinguishing equipment (specification No. G.8); mild steel exhaust pipework (specification No. G.9); DC switchgear (specification No. G.11); hot-cathode type rectifier equipment (specification No. G.12); wharf crane, receiving hopper and portable elevators (specification No. G.13); and electric motors (specification No. G.14). Specifications with forms of tender from the city electrical engineer and general manager. Tenders to Mr. J. F. C. M'Kinstry, acting town clerk.

Orders Placed

London.—BATTERSEA.—Electricity Committee. Recommended. Two batteries (£2,216).—Nife Batteries.

ST. PANCRAS.—Contracts and Libraries Committee. Accepted. Overhauling substation battery, with replacements (£141).—Tudor Accumulator Co., Ltd.

Portland.—Electricity Committee. Accepted. Transformer (£258).—Ferranti.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bedford.—Control room at Mill Street fire station (£533); Winton Hayes, Ltd.

Wireless receiving station; borough engineer.

Birdwell.—Works canteen; Newton, Chambers & Co., Ltd., Thorncliffe, Sheffield.

Bromley.—Works in connection with N.F.S. accommodation; S. Critchley Auty, town clerk, Municipal Offices, Bromley, Kent.

Burnham-on-Sea.—British Restaurant, Highbridge; U.D.C. surveyor's office, Public Gardens.

Calne.—Hut for British Restaurant at The Green (£1,000); borough surveyor, Town Hall.

Durham.—School meals facilities at a further 36 schools; county architect, 34, Old Elvet, Durham.

Exeter.—Shops, 95-9, Fore Street, and conversion of Exe House and St. Lawrence Home for hospital purposes; city engineer.

Glasgow.—Canteen, Shieldhall Riverside Quay; Clyde Soyabean Factory, Ltd.

Guisborough. — Extensions; Guisborough Shirt & Underwear Co., Ltd.

Hindsford.—Adaptation of mill as N.F.S. station; Travers & Gale, architects, 44, Church Street, Leigh.

Lancashire.—Wartime day nursery, Barrow; W. L. Gray (1933), Ltd., builders, Hospital Road, Farnworth, near Bolton.

Leigh.—Canteen extensions; Lilford Weaving Co., Ltd., Etherstone Mill.

London.—Fire station extensions (£3,400); L.C.C. architect, County Hall.

CAMBERWELL.—Four nurseries; borough engineer.

STOKE NEWINGTON.—Additions, Amhurst Park works, Eade Road; Courtney Pope, Ltd. Works; Steele's (Glass Merchants), Ltd.

Luton.—Four wartime nurseries; borough engineer, Town Hall, Luton.

Northampton.—Homes for aged and infirm, for Northampton Churches' War Memorial Committee; Rev. J. T. Lewis, Rural Dean, All Saints' Vicarage.

North Riding.—Central kitchen, Whitby (£1,362); Jaram & Son, builders, Scarborough.

School dining centre at Whitby and central kitchen at Northallerton; J. R. White, county architect, County Hall, Northallerton.

Northumberland.—Canteen, Longbenton Burradon School (£154); J. Oliver & Son, builders, Forest Hall. Canteen kitchen, Longbenton Westmoor School (£213); F. Hope, builder, Gosforth. Canteen, Bedlington Cambois School (£680); county architect, Mitford Road, Morpeth.

Poynton.—Parochial Hall and Sunday School for Church Council; Rev. J. G. S. Winstanley, The Vicarage, Poynton, via Stockport.

Rochdale.—Adaptation of premises, Birch Hill Hospital, for pathological services; borough surveyor, Town Hall.

Salford.—Wartime day nursery, Regent Road; W. A. Walker, borough engineer, Town Hall, Bexley Square, Salford, 3.

Smallbridge (near Rochdale).—Works canteen, Riverside Mills; Secretary, Britannia Mill Co. (Rochdale), Ltd.

Smethwick. — School canteens (£6,500); borough engineer.

Stockport.—Wartime day nursery, Adswood; W. F. Gardner, Town Hall, St. Peter's Gate.

Swansea.—British Restaurant, Castle Street; borough surveyor, The Guildhall.

Twickenham.—Adaptation of 33 and 35, High Street, Whitton, as a civic restaurant; borough engineer, Municipal Offices.

Tynemouth.—Warehouse, offices and stores, North Shields Fish Quay (£15,000); borough engineer.

Wartime nursery, Lovaine Place; Town Council (direct labour).

Bakery, West Chirton estate; North Tyneside Co-operative Bakeries, Ltd., North Shields.

Wakefield.—Canteen, West Parade Methodist Schools; Secretary, Wakefield Free Church Council, The Cottage, Arlington Street.

West Hartlepool.—Hostel for juvenile offenders (£2,500); F. Durkin, borough engineer.

Wolverhampton.—Canteen, Clarence Road; electrical engineer.

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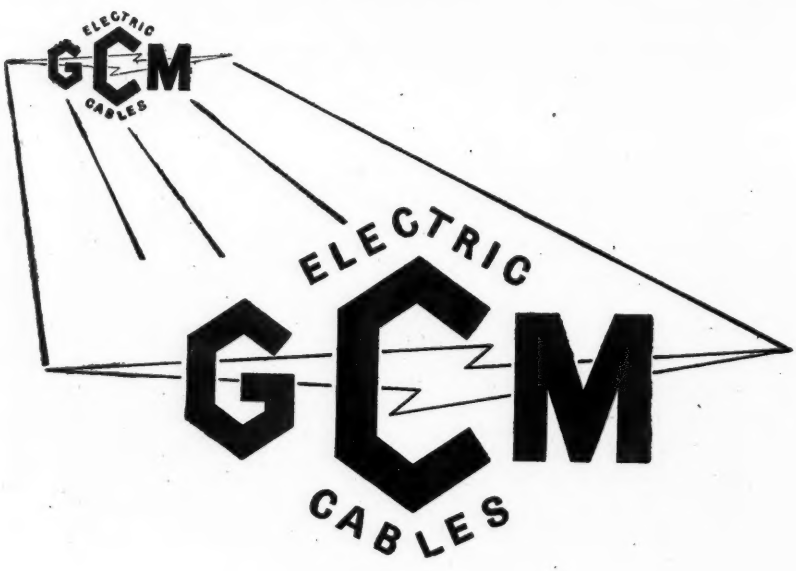

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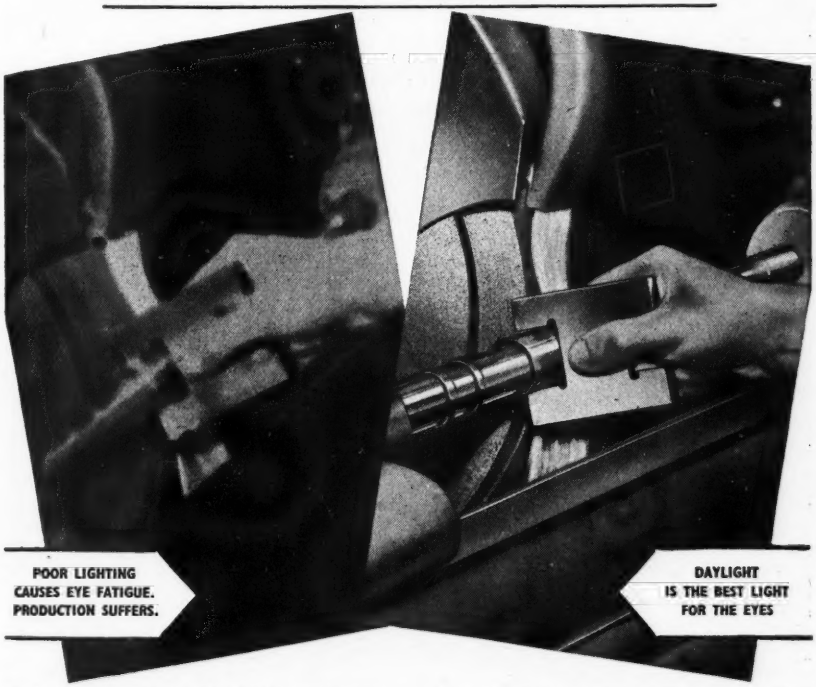

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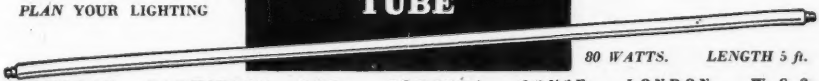

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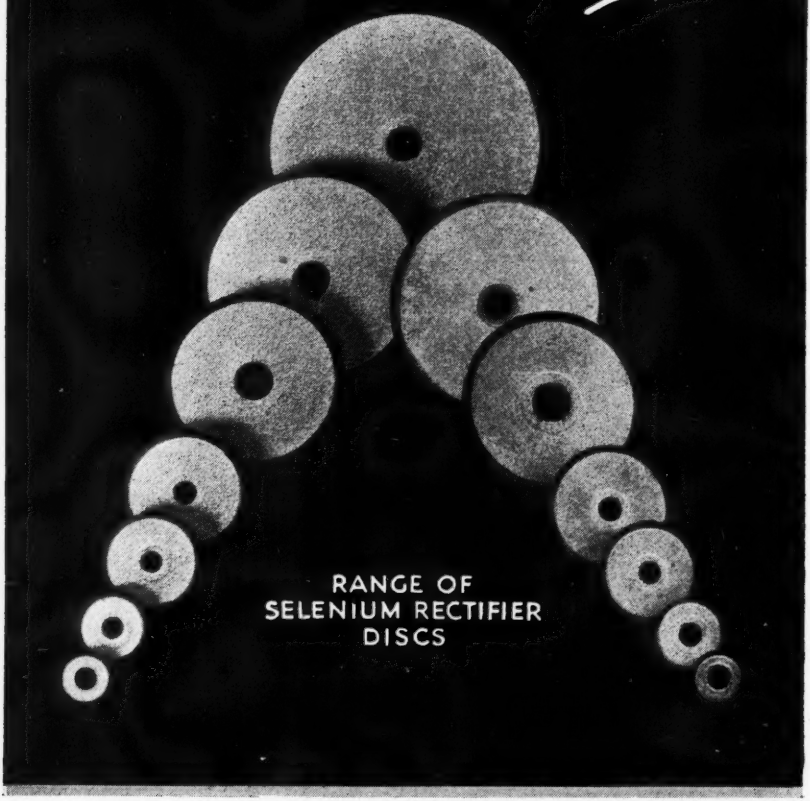

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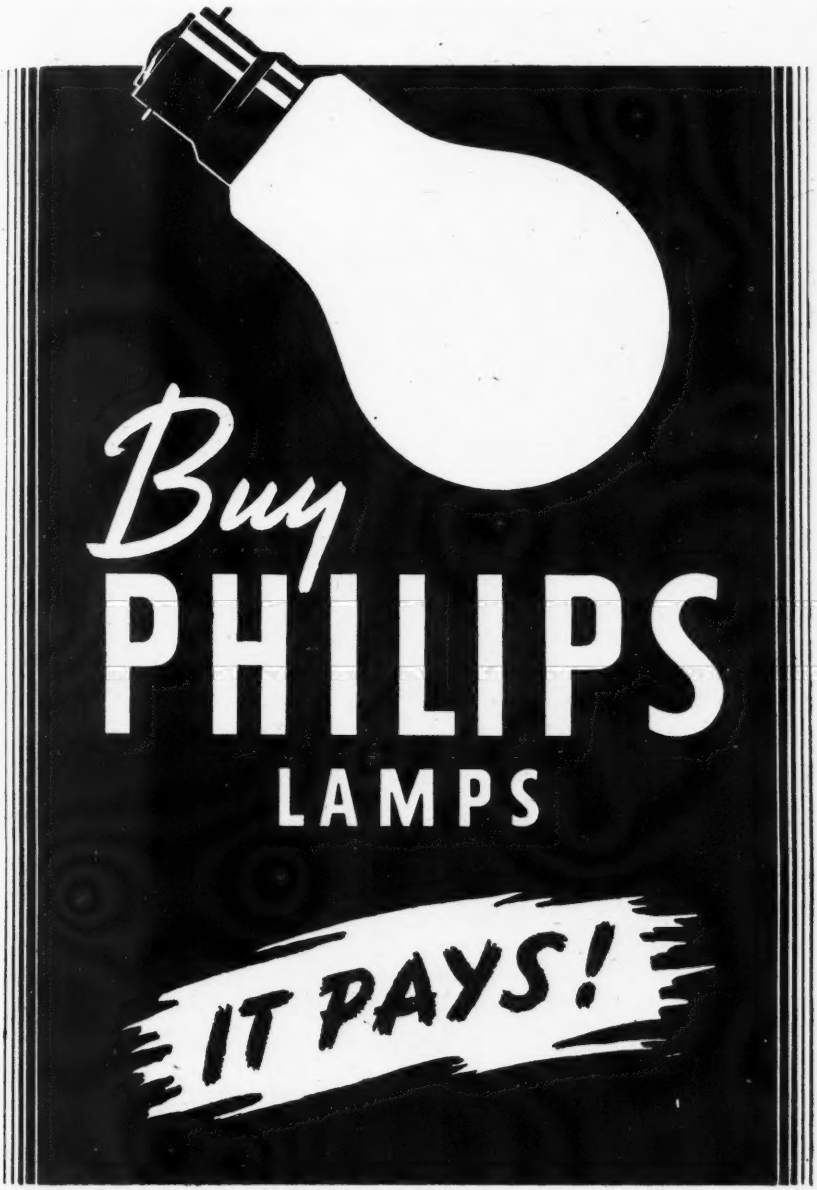

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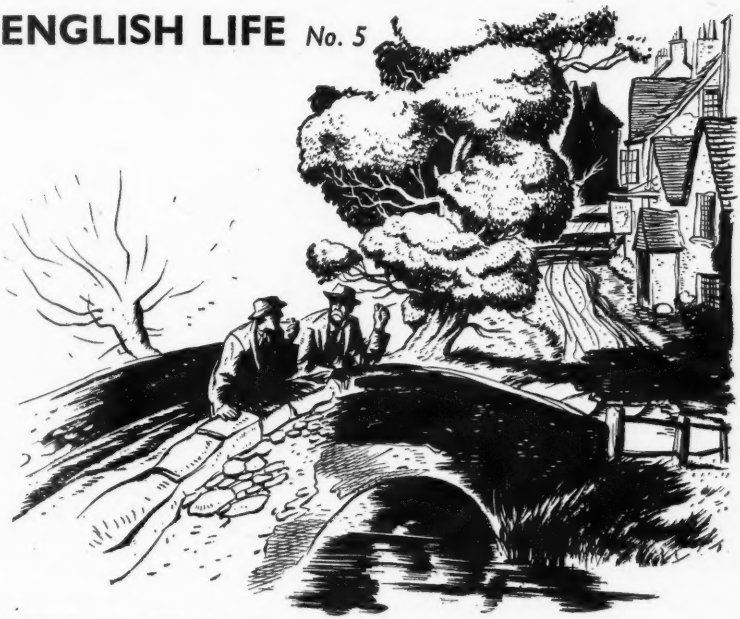

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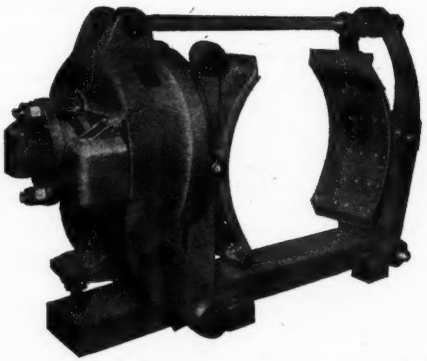

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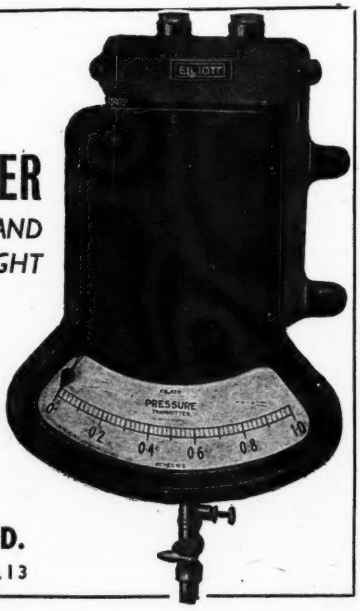

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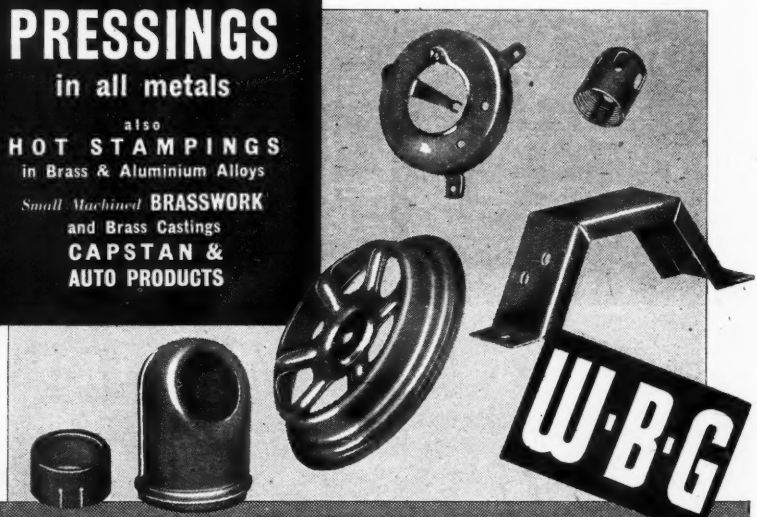

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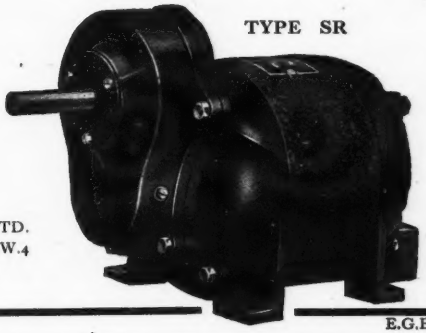

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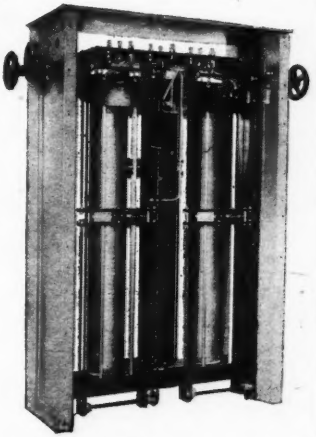

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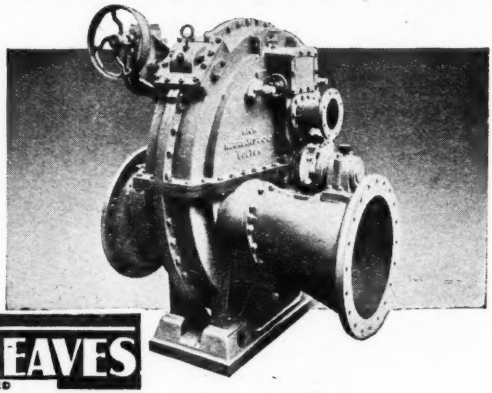

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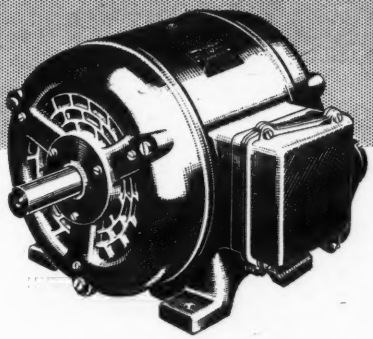

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